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Journal of the Society of Arts.

FRIDAY, MARCH 27, 1868.

Announcements by the Council.

Cantor Lectures.—Notice to Members.

Owing to unavoidable circumstances the last lecture of Dr. Crace Calvert's course will be delivered on TUESDAY, the 7th of April, instead of on Friday, the 3rd of April.

Artisans' Reports on the Paris Exhibition.

The Reports of the Artisans selected by the Council to visit the Paris Exhibition are now ready, and may be had of the Society's publishers, Messrs. Bell and Daldy, York-street, Covent-garden. One volume; demy 8vo., 732 pages, price 2s. 6d. in boards, or 3s. 6d. in cloth. The volume contains reports, by upwards of eighty artisans, upon the principal industries represented in the Exhibition, as well as special reports on the condition and habits of the French working classes.

Ordinary Meetings.

Wednesday evenings, at Eight o'Clock:—

April 1.—"How to make Railways remunerative to the Shareholders, beneficial to the Public, and profitable to the State." By Raphael Brandon, Esq.

April 8.—*Passion Week.* No Meeting.

April 15.—"On Liquid Fuel." By Benjamin H. Paul, Esq.

April 22.—"On the Cultivation of Beetroot, and its Manufacture into Sugar." By W. A. Gibbs, Esq.

Cantor Lectures.

The following is the syllabus of a course of four lectures "On Chloride of Sodium, or Common Salt, the Products obtained from it, and their Applications to Arts and Manufactures," now being delivered by Dr. F. Crace Calvert, F.R.S., as follows:—

Lecture III.—Friday, March 27.

Chlorine and its Compounds with Oxygen.—*Chlorate of Potash*—Its manufacture and remarkable properties. *Hydrochloric acid*, or spirit of salt—Its production and applications in Arts and Manufactures, viz., galvanizing of iron, sal ammoniac, chloride of tin, &c. Illustrations.

Lecture IV.—Tuesday, April 7.

The Conversion of Chloride of Sodium into Carbonate of Soda.—The decomposition of common salt into hydrochloric acid and *sulphate of soda*, Glauber's salt; the transformation of this compound into *soda ash*, *soda crystals*, and *bicarbonate of soda*, Ballard's process; and the important and recent discovery of the utilisation of soda waste, &c. Illustrations.

The lectures commence each evening at Eight o'clock, and are open to members, each of whom has the privilege of introducing two friends to each lecture.

Albert Medal.

The Council will proceed to consider the award of the Albert Medal at their first meeting in May next. This medal was instituted to reward "distinguished merit in Promoting Arts, Manufactures, or Commerce," and has been awarded as follows:—

In 1864, to Sir Rowland Hill, K.C.B., "for his great services to Arts, Manufactures, and Commerce, in the creation of the penny postage, and for his other reforms in the postal system of this country, the benefits of which have, however, not been confined to this country, but have extended over the civilised world."

In 1865, to His Imperial Majesty the Emperor of the French, "for distinguished merit in promoting, in many ways, by his personal exertions, the international progress of Arts, Manufactures, and Commerce, the proofs of which are afforded by his judicious patronage of Art, his enlightened commercial policy, and especially by the abolition of passports in favour of British subjects."

In 1866, to Professor Faraday, D.C.L., F.R.S., for "discoveries in electricity, magnetism, and chemistry, which, in their relation to the industries of the world, have so largely promoted Arts, Manufactures, and Commerce."

In 1867, to Mr. W. Fothergill Cooke and Professor Charles Wheatstone, F.R.S., in recognition of their joint labours in establishing the first Electric Telegraph.

The Council invite Members of the Society to forward to the Secretary, before the 15th April, the names of such men of high distinction as they may think worthy of this honour.

Institutions.

The following Institutions have been received into Union since the last announcement:—

Gloucester, Free Library Institute.
Oldham, Gladwick and Analytical Institute.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Committee met on Saturday, March 14. Present—Benjamin Shaw, Esq., Chairman, Capt. Grant, Harry Chester, Esq., and G. F. Wilson, Esq., F.R.S.

Mr. John A. Blake, M.P. for Waterford, attended to give information on the sea fisheries of Ireland.

Mr. Blake—Perhaps you may anticipate that my statement would be a lengthened one as to the existence of fish in the Irish seas, but I can dispose of that in less than five minutes; and it may be interesting, because the facts have been disputed by some parties. With respect to the point that the coast of Ireland is not adequately fished, I would submit to the consideration of the Committee one or two facts:—In 1846 the number of vessels and boats employed in fishing upon the Irish coast amounted to 19,883; the number of men and boys engaged in the same year was 113,073. In the year 1866 the number of vessels and boats engaged was 9,444, showing a decrease in 20 years of 10,439; and the number of men and boys in the trade was 40,663, showing a decrease in 20 years of 72,410. The time when the numbers amounted to the highest figures was immediately prior to the disastrous famine of 1848; and I could produce the highest authorities to show that in the opinion of those most competent to judge, the Irish coast, if properly fished at that time would have given full occupation to twice the numbers then employed. The Repeal Association of that day took a great deal of trouble to point out what the food resources of Ireland were, and very able essays were written, the truth of which was universally assented to, showing that the coast of Ireland was not a quarter fished. Assuming that to be so, it follows that it is not one-eighth fished at present. The decrease is mainly owing to the effects of the famine of 1848. No class suffered so much at that time as the Irish fishermen. Most of them held little patches of land, the produce of which was destroyed. People had not money to buy fish, and a change took place in their diet by the introduction of Indian meal in the place of potatoes. It was found that the use of Indian meal with fish produced dysentery, and this further checked the consumption. Numbers of the fishermen emigrated, and many went to the workhouse, and several died. At the present time there are the remains of fishing boats rotting on the beach round the coast, the owners having been unable at that disastrous time to keep their boats and gear in order, and many have never since resumed their occupation. There can be no doubt whatever that the Irish oyster fisheries are capable of enormous extension. I venture to say that they might be increased to the extent of a million sterling, and give an enormous amount of employment. The following are the figures as to the amount of fish caught in Ireland:—The whole amount of sea fish, exclusive of oysters, is £335,000, and the amount of oysters is about £45,000; and that is not sufficient to supply London for one month. I took a great deal of trouble to discover what is the amount of fish actually consumed in London, and had some difficulty in doing so. I wrote to the head official at Billingsgate, who could give me no information, nor could Mr. Francis Francis. I was thrown on my own resources, and after considerable research I arrived at the conclusion that in the whole of the metropolis £5,000,000 worth of fish is consumed in the year, 800,000,000 of oysters alone. Ireland exports very little fish at present. In fact, nearly £150,000 worth of foreign caught fish is consumed there annually. £80,000 worth is sent there annually from Scotland, and large supplies also come from Newfoundland and Norway, principally herrings and cod fish. Formerly, as is shown by my pamphlet, Ireland was a large fish exporting country. The fishermen of England and Scotland preferred coming to the Irish coast to fish, instead of their own. The Dutch at one period paid Charles I. £30,000 for the privilege of fishing off the Irish coast, and they continued doing so until the time of Oliver Cromwell, who drove them off. In 1556 the King of Spain paid £1,000 a year to the English Government for the same privilege, and in the same way England drew a large revenue by granting licenses to the French, Dutch, Swedes, Spanish, and other fishermen. At the time of the Commonwealth various petitions were presented, stating that the Irish interfered with the English fishermen, and that they fished with more success, and so forth, and, in consequence, by the Act of Transplantation, the Irish fishermen were nearly annihilated. Cromwell drafted many of them off into Connaught, and he actually transported and sold several cargoes of fishermen to Barbadoes. A great many Scotch and Cornish fishing boats still frequent the coast; sometimes there is a fleet of 200 sail, especially off the east coast, near Howth. There is a very famous bank near Waterford, called the Nymph Bank, where there is a large amount of flat fish, such as turbot and sole. Great efforts were made, and a company was formed shortly after the Union for the purpose of fishing; but when the Company's Bill came to a second reading, several fishing communities in England petitioned against it, representing the great injury they would suffer, and it was lost by a majority of one. I might multiply instances to show that there is as much fish in Ireland now as at any time, although the fishermen have so greatly decreased in numbers. I state most confidently that, taking the matter at a very low estimate, the supply of food to the kingdom might be increased by £2,000,000 at least from Ireland, and that by means which seem so very small compared with the result that it is a subject of astonishment they have not already been adopted by the Government. For several years I have been so impressed with the importance of this subject that I have brought it repeatedly before the House of Commons; but I was unsuccessful until last year, when I obtained the appointment of a Select Committee upon the subject. The rule in such cases is for the Government to nominate half the committee, and the member who obtains it to nominate the remainder. The gentlemen whom I named were not all favourable to my views, as I wished to win them over by the witnesses who would be produced. A great many of the gentlemen appointed by the Treasury were not anxious that the means I suggested for the resuscitation of the Irish fisheries should be adopted, but, as I understood, agreed with the views of the Treasury. However, the committee sat a considerable time, and examined a number of important witnesses, and, after two months' investigation, they came to conclusions entirely carrying out the suggestions which for a number of years I had offered. The list of the committee is given in my pamphlet; and in their report they say that the points they considered were—1st, the condition of the sea fisheries; 2nd, whether the restrictions imposed on particular modes of fishing were advisable; 3rd, whether the fisheries admitted of a greater development; 4th, whether the State could judiciously assist in developing the fisheries; 5th, the expediency of framing regulations to facilitate the making of agreements between the owners of fishing craft and crews; 6th, of vesting the chief authority, with regard to the fisheries, in the Lord Lieutenant, and placing the general control and superintendance under a special board; 7th, of consolidating the several statutes relating to the fisheries. One matter, which it was considered had considerably tended to prevent the due development of the fisheries, was the restrictions imposed upon a particular mode of catching. For instance, in every bay and estuary where trawling could be carried on restrictions had been imposed upon it; these restrictions were imposed at the instance of the line fishermen by the Board of Works, who, unfortunately, acquiesced in their views.

The CHAIRMAN—Are those restrictions different from those in force in England?

Mr. BLAKE—There never were any such restrictions in England. The Fisheries Commission was appointed for the purpose of considering whether they were desirable, and they were reported against. Similar restrictions existed in Scotland, but a bill was brought in last year for the purpose of removing them altogether. In Ireland, wherever trawling could be successfully carried on in bays, these restrictions exist, and that prevents the catching and supplying to the consumer of large quantities of fish. At certain periods large shoals of fish come into the bays and estuaries for shelter, and there they might be captured, but in consequence of these restrictions they are not, and after a certain time they go off again, and are lost. The idea was that fish deposited their spawn in the shallow waters of bays and estuaries, but that is by no means certain: it is not known where the spawn is deposited. But even if they did deposit their spawn in the shallow waters, it would be in situations where the trawl would not affect them. The Committee were of opinion that it was by no means proved that these restrictions were expedient, and recommended the total abolition of all restrictions on sea fishing, leaving to a future board, to be appointed, to determine by experience whether it was desirable to re-enact these restrictions with respect to trawling. The Committee also recommended a better superintendence and inspection of the fisheries, which at present is very inadequate. Upon the third head the Committee were very strongly in favour of the policy of aiding the fishermen by loans. It has been proved by experience that this system has had a very beneficial effect in Ireland. As I have already said, many fishermen have been obliged to give up their occupation through want of means to carry it on. There is a society called "The Society for Bettering the Condition of the Poor in Ireland," whose funds at command perhaps amount to £30,000. They have devoted about £20,000 of that to the purpose of aiding fishermen to procure boats, gear, &c.; and during a period of many years that they have been in operation, they have done an immense deal of good to a vast number of fishermen, and they have never lost a shilling, the amounts lent always being faithfully returned to them. The Society of Friends, in Ireland, has also, on certain occasions, lent money to the fishermen for the same purposes, and it has always been repaid. Miss Burdett Coutts had greatly assisted the fishermen on the island of Cape Clear, but in her case the money was given as a gift.

Mr. CHESTER—Were the advances made originally as loans, and then turned into gifts?

Mr. BLAKE—No, they were made as gifts in the first instance. The gifts were turned to the best account, and enabled a number of men, who were completely stricken down by poverty, to make a fresh start, and they are now in a very comfortable position. We recommended to assist in resuscitating the fisheries by aid of that kind. In the first place we recommended that the sum of £10,000 should be given for the purpose of loans, to aid in the establishment of curing-houses round the coast. The fishermen often go to sea and bring home a quantity of fish, and after supplying the immediate wants of the neighbourhood, what remains is a drug; it often becomes useless, and sometimes has to be sold for manure. If curing-houses were established the surplus fish would be disposed of, and a ready sale could be obtained for it at times when fresh fish was scarce. We considered that if Government offered to lend half the required amount on good security, it would lead to the establishment of such a number of curing-houses round the coast as would supply the great want that exists in this particular; and fishermen would then go more confidently to sea, knowing that if they could not sell the whole of their fish fresh it would not be wasted. We also recommended that the State should lend, in the same manner as the Society for Improving the Condition of the Poor, a sum of £50,000, not all at once, but extending over a series of years, say £10,000 a year, until the whole was expended, and that that should be kept revolving, as it were. In no instance should anything be given as a free gift, and nothing should be lent except on good security; the person borrowing giving his own security, that of his boat, and of two approved sureties. That would be advantageous in this way—the man would feel that he had to repay the loan, which would be a stimulus to his exertions; and his two sureties would also keep an eye upon him, to see that he did not flag in his industry. We all came to the conclusion that the chief means, at all events, by which the fisheries could be resuscitated would be a system of loans of this kind.

Captain GRANT—Are you aware that very great opposition was offered to English fishermen when they went to Ireland to fish, and that acts of violence were committed by the fishermen, in some cases almost amounting to murder?

Mr. BLAKE—The opposition was not against the Englishmen as Englishmen, but against trawling. So far from having a prejudice against Englishmen and others coming to fish there, the Scotch, I may say, go there in great numbers, and are always very well treated; sometimes they have 200 or 300 vessels there, on the east coast. But, if Irishmen went there with trawls they would be treated quite as badly as the Englishmen you refer to. Several English companies have been formed for fishing—some on my own coast, near Waterford, and the Irish have never shown any prejudice against them as Englishmen; their prejudice is simply against trawling. We consider that Ireland has fair claim to these loans, inasmuch as Scotland has received, since the union, a million and a quarter more for the development of her fisheries than Ireland has; and Scotland now receives £15,000 a year for her fisheries, and has a numerous staff of inspectors, whilst Ireland has only one. Giving the full benefit to everything which comes from the Consolidated Fund, Scotland receives between £8,000 and £10,000 a year more for the development of her fisheries than Ireland does.

Mr. CHESTER—How is that money administered?

Mr. BLAKE—By the Scotch Fishery Board. There is a large unpaid board, consisting of noblemen and gentlemen, and they have a secretary and a numerous body of inspectors.

Mr. CHESTER—Allow me to ask you this question: without going into remote history, but reckoning, say, from the union, at the beginning of the century, during what period of ten years have the Irish fisheries been most flourishing?

Mr. BLAKE—In the year 1819, when an extensive system of bounties was introduced, there were 27 bounty vessels and 188 men engaged in the fisheries, and they received a bounty of £573. In 1822, three years later, the number of vessels had increased to 28,380, and the men to 44,892. In 1829, when the bounties were taken away, the trade fell off again considerably, but it subsequently revived again, and, I should say that from 1836 to 1846 was the most prosperous period, after they had recovered from the depression caused by taking away the bounties.

Mr. CHESTER—As a matter of fact the bounties seem to have greatly increased the Irish fisheries, but they arrived at their maximum sometime after the bounties were discontinued? You think, under present circumstances, a system of bounties is necessary for a certain time to revive them?

Mr. BLAKE—Not bounties; loans.

The CHAIRMAN—What analogies can you produce for such a system of loans? Here in England we have loans made by the Commissioners of Public Works, for the purpose of assisting in draining land, erecting farm buildings, and so on; but what is the nearest analogy you can give for a system of granting loans for the purchase of fishing-boats, nets, and gear?

Mr. BLAKE—I can only point to the great success that has attended the loan system, at the time of the bounties, which did more good than anything else. The Society for Bettering the Condition of the Poor in Ireland has always about £20,000 out in this way, and they have never lost a shilling. A large sum of money was raised in 1822, for the purpose of relieving the poor people in the famine times; this was the origin of the fund. The money was not given entirely for the fisheries, but for other objects also. I cannot offer any other analogy. Money is advanced for improving the land, but not for improving the fisheries. I contend that the sea offers as good a field for enterprise, and will yield even a better return than the land. Many fishermen would be able to obtain sufficient security to satisfy the Government, and thus it would tend considerably to improve the condition of the coast population. I would not lend anyone money without good security. The system has already worked well on a small scale.

Q.—Was there not an occasion, some time ago, when boats were provided for the men, and they were too idle to use them? Did not something of that sort occur after the famine?

Mr. Blake—No; the Government advanced £5,000 for the establishment of curing-houses, and wherever they where put up, and the Government became the purchasers of the fish, the men were very industrious, and the Government made, in some instances, 40 per cent. by their dealings. They were then given up, on the supposition that they would be taken up by private individuals, but the country was so unsettled that this did not prove to be the case.

Mr. Chester—Under what arrangements is the fishing generally carried on? Does one man own a good many fishing-smacks, or does a single vessel belong to a good many owners?

Mr. Blake—Except on the east coast, where the herrings are caught in the greatest quantities, the fishing is mostly carried on by individual fishermen. Upon the east coast there are some few companies; that is to say, a fishing boat of 50 tons would be owned by the captain, and perhaps some people on shore may have a few shares in it. Mr. Good, of Dublin, the largest owner of fishing boats in Ireland, has 13 trawling vessels; and there are some two or three other owners of trawling vessels, but generally speaking, the fishing is carried on by small fishermen, and that is the only way in which it can be, on the whole, successfully carried on in Ireland. There is not one instance of a large fishing company being established which has not been a failure. The reason is this. Fishing, beyond everything else, requires the most careful supervision of the parties personally interested in the matter. Every spar, rope, and sail must be looked after with the greatest care, and unless a man has a personal interest in the concern he will not exercise that continual care.

Mr. Chester—Might not that be attained by the principal of co-operation; each man employed having a certain share in the boat and her earnings?

Mr. Blake—That would do very well with small companies, but where there is a large company, with directors, secretary, a manager, and all that, all drawing salaries out of the concern, and exercising insufficient superintendence, the result has always been a failure as far as experience has yet gone. I could name half a dozen companies which have been started from time to time, chiefly with English capital, and which have failed every one of them. The fishing can be carried on more successfully by individual fishermen, and one reason for that is the tempestuous character of the Irish coast. It is desirable that such fishermen should possess a little land, because there may be weeks together when they cannot go to sea at all. It is only the man who lives close to the coast who can tell by certain indications when he should go out; and then if he can stay out but a day or a few hours, he may catch some fish, and return, and he has his little bit of land to occupy him and keep him from the public-house when he cannot go to sea. If you have fishing boats owned by companies, you then have regular crews to man them, who have no other occupation; they would be very often in port a week or two at a time, unable to go out, and during that time they would give themselves up to drinking and idleness, and when the time came for fishing it might be difficult to get them together. There is a great want of harbours, especially on the western coast, and that is one of the reasons which prevent more persons engaging in fishing enterprise.

The Chairman—You said that on the east coast there were some small fishing companies. Is it not also the fact that, in spite of all these disadvantageous circumstances, there is a marked increase in the east coast fisheries, and does not that tend to show that that system works better than the other? Or to what do you attribute the fact that, whilst there is such great depression on the Galway coast, on the eastern coast, at Cork and Bandon, there is a large increase in the number of vessels engaged?

Mr. Blake—The east coast is much more frequented by the herrings than the other. Last year there were £150,000 worth of herrings taken upon the east coast.

The Chairman—That would not apply to Cork and Bandon. How is it that the east coast, and the Cork and Bandon fisheries, seem to be exempted from the operation of those causes which operate so prejudicially on the western coast?

Mr. Blake—The increase in the Cork and Kinsale fisheries was in the six years from 1861 to 1867, but that return includes the inland fisheries. Bandon is an inland place, and therefore there could not be sea fisheries there. There is a great deal of salmon which comes over the different railways, and is included in that return.

The Chairman—That would not apply to the whole of the east coast. How is it that the increase on the east coast has been so large—between Dublin and Drogheda from £842 to £1,314, and from Dublin to Wexford £1,080 to £2,565—more than double?

Mr. Blake—That return rather confuses you, because it includes the large increase which has taken place in the inland fisheries. To explain why the east coast appears so much better than the south and west is a matter which it is hardly worth while to go into.

The Chairman—It might be very important, because it might arise from a superiority of harbours, or from a superiority in the character of the people, or from a superiority in the fishing boats and gear, or from the partnership system.

Mr. Blake—Hitherto the greater part of the east coast fishing has been carried on by Cornish men and Scotchmen. Then the Society for Bettering the Condition of the Poor have made considerable advances to parties on the east coast, and, as I state in my pamphlet, the tonnage has increased there very considerably. As regards the Kinsale Company, that is a local company, and has, I believe, turned out pretty well. Then there has been a good deal of mackerel caught there of late, which has sent an immense quantity of fish over the Cork and Kinsale Railway. The east coast fishing has also been improved by the operations of the Society to which I have referred. Mr. Andrews, one of the witnesses examined, says: "At Howth most amazing results have been consequent through the application of the Society's funds. The Howth boats in 1862 numbered only four or five, manned by natives of the place, the boats being ill-formed and ill-adapted to cope with the superior equipment and skill of the Scotch and Cornish boats. In the year above mentioned the Society influenced some spirited individuals to embark largely in fishing, and by example and employment of the fishermen, have improved the means and condition of the latter, and secured to them some of the advantages which had for so many years been reaped by strangers. Now there is a fleet of vessels of a much superior class, owing, in a great degree, to the loans from the Society."

The Chairman—What induced them to give that aid especially to fishermen on the east coast; and if it answered so well there, why was it not extended to the west coast?

Mr. Blake—The society has only £30,000 at command for all purposes, of which the improvement of the fisheries is only one. It gives aid to flax-spinning and local manufactures, on a small scale, so that about £20,000 is the amount it can spare for the fisheries. It is the remains of a charitable fund raised for the relief of distress in 1822. They have lent the money principally to the east coast fishermen because, in their view, they got better security from them. They do not go about seeking people to take loans, but grant them to those who apply, and who can give good security. In the county of Kerry, at Dingle, the fisheries have been raised from a very low condition to a prosperous one by means of these loans.

The Chairman—Do you think it likely that the system of loans would induce an improved system of fishing in Galway, or that the people would set themselves against the use of larger boats and better gear? I see the report of the Fishery Commissioners refers to the opposition of local fishermen in Galway to improved methods of fishing; and unless some security were taken for better appliances being used, it appears to me that very little good would be effected.

Mr. Blake—In speaking of Galway, I think you refer to a place called Claddagh, in the Bay of Galway; but Galway is a wide district. I believe the Commissioners refer especially to the opposition of these Claddagh fishermen.

The Chairman—They use the most wide terms, referring to the whole west and south coasts, and they speak of the severity of the weather, the depth of water, the want of shelter, and the opposition of local fishermen.

Mr. Blake—The improved method we are anxious to introduce is trawling. I propose to remove all restrictions from trawling, and if there is any opposition on the part of the fishermen it ought to be suppressed.

The Chairman—The prejudice against trawling is not confined to Irishmen. The Scotch also make the greatest possible opposition to trawling, and cry out that the fisheries will be destroyed if the system is not abolished.

Mr. Blake—It is in reality a struggle between two interests, the line fishermen and the trawlers. But the small fishermen use what is called a "pole-trawl" themselves.

The Chairman—That affects the question very materially upon a stormy coast. It is only by the introduction of larger vessels, which can hold the sea in tempestuous weather, that this great wealth of fish can be brought to light. The question is, what chance there is of introducing these larger vessels, and what security can be obtained on this point, before the loans are granted.

Mr. Blake—I think that would follow. If this system were adopted it would tend to the formation of small companies, which are the ones most likely to succeed. It would also help the poor man to set up his small boat, and he is the most important man of all, for the extent of trawling ground is very small compared to the large extent of coast where trawling cannot be carried on at all. If the fisheries are to be developed you must help these small, and, what you may think, insignificant men.

The Chairman—Do you think the Irish coast is worse than that at the north of Scotland; about the Hebrides, for instance, where fishing is carried on successfully?

Mr. Blake—I consider part of the west coast of Ireland the worst in the world. Those who have not seen it can form no idea of what it is like. There are not so many islets to break the force of the waves as about the Hebrides. The whole force of the Atlantic wave is expended on the shore. I have seen places where the waves swept away a small house some little distance in; and in some places there is a line of rocky coast or beach, half a mile in width, from the sea continually sweeping over it.

Mr. Chester—If Parliament established such a fund for granting loans, do you think it would be desirable or not to require the co-operation of some local body before any Government aid was afforded? To say, for instance, in Galway, if you raise a certain sum by local effort to be expended in this manner, we will back it with so much more—perhaps a larger sum. Would not that cultivate the local interest, and improve the security to the Imperial Government?

Mr. Blake—Your theory is very good, but there are many circumstances which would prevent its being carried out. I should say that the Government Inspector of Fisheries in Ireland, Mr. Barry, who is willing to give evidence here, is strongly in favour of loans. He is a very experienced officer; and a number of experienced witnesses who were examined before the Select Committee were all in favour of the plan, and of opinion that it could be successfully carried out.

The Chairman—We have no doubt as to the demand for fish, and that, practically speaking, any quantity can be consumed. The question is whether it can be brought to market. What presses on my mind is the question what guarantee have you that the existing prejudices can be overcome, so that the fishing can be carried on upon a large and substantial scale. Are the Cornish boats which come to the east coast better, or better found than the Irish boats?

Mr. Blake—Some of the Irish have as good boats as those. I would not grant the loans except on condition that good boats were introduced; and by having a larger staff of inspectors it could be easily carried out. The first thing to ascertain, when a man applied for a loan, would be that he could give good security, and then the condition should be imposed that the boat should be of an approved description.

Mr. Chester—In the same way as when loans are made in England for public improvements, drainage, and so forth, the Commissioners require the plans to be laid before them before a grant is made.

Mr. Blake—I would not make a grant unless I were satisfied that the fishing was to be carried on in the best possible manner.

The Chairman—As to the means of transport; if there is a large take of fish, what prospect is there of bringing it to a profitable market?

Mr. Blake—There are increased facilities now afforded by the railways, and there will be more as they become developed; but still, in certain places, especially on the west and northern coasts, there is no adequate means of reaching distant inland markets, and it is in such places that the establishment of curing houses would be of such value; so that after the immediate locality was supplied the remainder of the fish might be preserved for future use. The plans I suggest, including the appointment of additional inspectors, would cost, I believe, about £3,000 per annum, or about £2,000 annually more than is at present expended on the Irish fisheries. In speaking of good boats, the conditions of the locality must be considered, because in some places boats of 40 tons should be employed, whilst in others, a boat of 10 tons would be the right thing.

The Chairman—It appears to me that your plan embraces two objects; one to develope the fisheries of Ireland for the benefit of the United Kingdom; and the other a *quasi*-eleemosynary one of assisting a certain class of Irish fishermen. It might be, might it not, that to advance the second object it might be very desirable to encourage the use of a small class of boats, whilst such a thing would be very undesirable looking only to the first, and to that end only the best methods of fishing should be encouraged.

Mr. Blake—The first great thing is to remove the restrictions which now exist, and then, I think, will follow the formation of small companies for working the fishery in that way, with boats of 40 or 50 tons, costing, say, £500. If government would advance half that sum on the security of the boats and the persons connected with them, I think these companies would soon spring up.

The Chairman—You think the boats would be worked by part-ownership, and not by a system of each man having his own little boat, which, it seems to me, would be fatal to any chance of improvement.

Mr. Blake—There I differ with you. There is a vast amount of coast which can only be fished in that way, by small fishermen living on the coast, and having a bit of land to attend to when they cannot go out. A man like that would go out and catch his fish, and be driven in again by the weather before a larger boat could come from the nearest harbour. I am quite satisfied that in order properly to develope the fisheries of Ireland you must encourage this class of men. I think one inspector, as at present, with a well-qualified assistant, might do a good deal, so as to try the plan on a small scale at first. The success of it, however, has been already proved by what has been done by the society I have before mentioned. The expenditure of £5,000 or £10,000 a year for a few years seems almost ridiculous when you propose to benefit, not only the fishermen on the coast, but the coast population. I have no doubt that a good deal of fish would go to England from the west coast; there is very good railway accommodation from Galway to Dublin. There is room for an immense development of the trade on the east coast. The Nymph Bank is about 50 miles long, some miles in width, and there is room there for twenty times as many boats as now go there. I think there would be a good margin of profit left on the sale of the fish if the trade were properly conducted.

The Chairman—I am afraid that one great difficulty would be that the railways would not work well with the small fishermen, because the take would be inconsiderable and uncertain.

Mr. Blake—At Waterford, Howth, Kinsale, and other places I could name, there are small fishing companies, which get on very well. They have boats of from 30 to 50 tons, and find very profitable occupation for them. Large companies have been tried, but they do not answer. More money, probably, has been lost relatively in Irish fisheries than in anything else. This is owing to the expenses of management, and the want of a rigorous system of supervision and economy in the working. Mr. Good, of Dublin, who owns 13 vessels, is a rope and sail maker; and although he looks after the boats as well as he can himself, he cannot make more than 8 or 10 per cent. out of them. Sometime ago he started a few boats, not owned entirely by himself, but shared by a clever old Scotchman, who sees every boat go out and come in, and looks after the expenditure in every way very keenly. Out of these boats they make 2 or 3 per cent. more than out of the others.

Captain Grant—I do not see how men working singly can make a profitable occupation of the trade unless there is some one who will buy the whole of the fish when they come in, and send it off. They cannot send away the fish by rail themselves. In our fishing towns there are men ready to take the whole cargo at a certain fixed price per ton, and who take the risk and responsibility of disposing of the fish. Unless something of this kind could be secured in Ireland I don't think the fish would find a market.

Mr. Blake—In the larger ports there are dealers who purchase the fish in that way; and there is a class of men, called "jolters," who travel about the country for the same purpose. They know as well as possible when and where there is likely to be a take of fish, and make their movements accordingly. The fisherman sends his family about to sell what fish they can in his immediate neighbourhood; and the jolters are always going about looking out for purchases. The fisherman could not always depend upon selling his fish in that way, and for that reason I advocate the establishment of curing houses, which I believe would pay well. I do not contemplate the fishermen themselves paying for the curing of the fish, but that persons, perhaps borrowing half the necessary capital from the government, would set up curing houses as a speculation; buying the fish from the fishermen and curing it. There would be no question of a demand for it. Ireland consumes £150,000 worth of foreign cured fish now, which shows what an opening there is; and some curing houses have been successful.

Mr. Chester—The points just raised seem to depend on the development of the trade; and the fact of these facilities for disposing of the fish, all of them requiring more or less capital, is no reason why they should not be called into existence as the trade becomes developed.

Mr. Blake—Precisely.

Mr. Chester—Is it your opinion that if there were a more efficient system of inspection (I do not say a word against the present inspector, but if he had more assistance), many of these difficulties which have been mentioned would be removed. If the inspectors were constantly going about pointing out what arrangements were expedient, and suggesting how difficulties should be overcome, as has been done in England, would not a great deal of good be accomplished? Lord Carlisle sent agricultural instructors about the country, and I do not see why fishing instructors should not be employed in the same way?

Mr. Blake—That would be very advantageous indeed, but it would not accomplish everything. Mr. Barry does all a man can do, but he is not enough.

Mr. Chester—Is there any uniform law regulating the fisheries in England, Ireland, and Scotland?

Mr. Blake—There is no law at all in England as to sea fisheries, nor any inspector. They do not even collect statistics. Anyone fishes who likes, and when and where he likes. In Scotland there is the Board I have mentioned, but there is no law at all for England or Wales. As far as the law goes, I think it would be a great advantage if there were no more restrictions in Ireland than in England.

The Chairman—My great difficulty is this:—There seems in Ireland a great disposition to till the land, and no doubt there is the same disposition to get as much as possible out of the sea; but I am afraid there is not enough of a commercial spirit to make the best of it when it is got, and that it will end with supplying the immediate neighbourhood, instead of sending the fish to England to supply the great centres of consumption.

Mr. Blake—In 1846, before the trade was almost annihilated by the famine, there was an immense deal sent to England. It was collected by the jolters, who were always going about with their horses and carts, and forwarded. Bacon and other produce is sent from Ireland in considerable quantities. The Board of Works have the power of making any bye-laws they please, and in every bay and estuary they have drawn a line from headland to headland, within which no trawling is allowed by vessels of a certain tonnage. Into these bays come immense shoals of fish, which cannot be captured by the small boats, and may not by the larger ones.

Mr. Chester—Is trawling only carried on in the bays and estuaries?

Mr. Blake—Oh, no; it is carried on in the deep sea, but in all the bays and estuaries, where it could be conducted most successfully, it is prohibited. In some bays it could not be done at all. There must be a peculiar bottom to allow of trawling.

The Chairman—Is it not a fact that Professor Huxley and others have declared that fishermen are entirely mistaken in supposing that trawling destroyed a large quantity of spawn, and that what the fishermen supposed to be spawn was not spawn at all?

Mr. Blake.—Yes; with the exception of the herring it is not known where any fish spawn.

The Chairman—As I understand, the evidence not only negatives the supposition that the spawn is destroyed by trawling, but is absolutely in favour of that process.

Mr. Blake—If the fish do spawn in the bays and estuaries it must be as the herring does, on rough bottoms, where the trawl would not work. I would remove all restrictions, but keep up a system of inspection for the sake of supplying information, and to superintend the laying out of the loans. I say—catch as much as you can, in season and out of season. Anything which man can do to catch fish does not amount to one-tenth of the extent to which they devour each other. Mr. Barry is in favour of the system of loans, and also another experienced officer.

The Chairman—In what stage is your bill?

Mr. Blake—Some few changes were introduced into it in accordance with the recommendations of the Committee, and the Government promised to consider it in the recess, and I am now watching and waiting to see what they will do. I am afraid their hands are too full for them to do anything. Something considerable might be done in Ireland with oysters by artificial culture. The proposed convention with France would soon annihilate the best oyster beds, as it goes on the system of having no protection for the oysters in the breeding season. If you could give an increase of food to the country to the extent of £1,000,000 to £2,000,000 by a loan of £50,000 I think it would be a very judicious outlay, even if the amount of the loan were entirely lost.

The Chairman—Oyster fisheries must be conducted on a system of culture to a great extent. Do you deal with that in your bill?

Mr. Blake—To some extent. I would have oyster instructors, as there is an immense deal of ignorance on this subject. The ground that answers for breeding does not do for fattening, and *vice versâ*. It should be undertaken by companies or by individuals, as in France. By increasing the facilities for the ascent of salmon up the rivers in Ireland, the amount taken, which has gone down to £300,000 worth a year, might be increased to a million sterling, and I believe it might even be increased to two millions. I would have every river in the kingdom as free for the fish to pass as the high road is for passengers.

The Chairman—Do you propose loans to oyster companies, or merely powers to appropriate portions of mud for fattening, and so on?

Mr. Blake—That is all that is proposed by the bill. But I think loans would prove useful, too, in developing the oyster fisheries.

Cantor Lectures.

The second lecture of Dr. Crace Calvert's course, "On Chloride of Sodium, or Common Salt, the Products obtained from it, and their Applications to Art and Manufactures," was delivered on Friday evening, the 20th inst.

Sixteenth Ordinary Meeting.

Wednesday, March 25th, 1868; Sir John Lubbock, Bart., F,R.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Drummond, Peter Robert, Perth.
Foster, George, Rochford, Essex.
Jeffery, Walter, 35, Eastgate-street, Gloucester.
Wilson, Edward, Hayes, Kent.

The following candidates were balloted for, and duly elected members of the Society:—

Phillips, John, Epsom.
Stewart, Captain the Hon. Randolph, 85, Eaton-sq., S.W.

The Paper read was—

HIPPOPHAGY: THE HORSE AS FOOD FOR MAN.

By A. S. Bicknell, Esq.

The History of Hippophagy in Ancient Times.

The word Hippophagy, I need hardly say, is derived from the Greek *ἵππος*, a horse, and *φάγω*, I eat. Our dictionaries do not contain it, but nevertheless it is not new. Claudius Ptolemy in the second century called certain races who subsisted on horse-meat "Hippophagists."

The practice of eating horses existed in very early times. Herodotus (b.c. 484—408) tells us it was the custom of the Persians on their birthdays to furnish their tables more plentifully with meat than at other times. "The rich serve up oxen, horses, camels, and asses, roasted whole; but the poor use smaller animals." The Chinese, Tartars, Cossacks, and many Asiatic and African tribes still consider the flesh of horses a delicacy.

Virgil (b.c. 70—19) speaks of the fierce Gelonian or Scythian who drank milk thickened with the blood of horses; and Horace (b.c. 65—8) says, "I will visit the Briton inhospitable to strangers, and the Concanian (Spaniard or Thracian) delighting in the blood of horses." From which passages we may safely infer that if the Gelonian and the Concanian drank horse-blood they also consumed horse-flesh. Martial in the first century, Sidonius Apollinaris in the fifth, and many other writers of more or less eminence during the early Christian period, also bear testimony to the fact that hippophagy was commonly practised throughout Southern Europe and the East. The legend of the Centaurs arose from stories told of the Sarmatians and Thessalians, who lived and even slept on horseback, eating as their common food raw horse-meat and cheese made from horse-milk. Till the eighth century the horse was certainly considered fit for food; what, then, was the cause of an entire change of opinion in this respect? It is easily discovered in the following circumstances:—Between the years 731 and 741 St. Boniface, the apostle of Germany, complained to Pope Gregory III. that one of the chief obstacles to his success in converting the Germans arose from their attachment to the practice of sacrificing horses and Christian priests to idols, the special inducement to offer the former being the partiality of the people for the meat. He thought that if the horse could be brought into disrepute by a Papal censure it would be of much advantage to his mission. Gregory replied in these terms:—"You say that some eat the wild and very many the domestic horse. This, most holy brother, you must never allow to be done, but, with the assistance of Christ, prevent it by all means, and impose a suitable penance; for it is filthy and execrable." This prohibition, strong as it was, nevertheless failed in its object; for about ten years later St. Boniface complained to Gregory's successor, Zachary I., that the horse still stopped the way to the complete conversion of the heathen, and his Holiness thereupon added his interdict to that of Gregory. "Beavers," he said, "hares, and much more the wild horse, are to be avoided." Zachary seems to have taken a curious interest in cooking, for shortly afterwards jays, crows, and storks were forbidden by him; and in a letter to St. Boniface he says, "You ask me how long lard is to be kept before being eaten. The Fathers have ordained nothing on the subject, but the advice I myself give is that it should not be eaten till it has been smoke-dried or boiled over the fire." In the greater portion of Europe, however, these Papal interferences ultimately were effectual, and gradually, when the prohibition was forgotten, the meat, from being merely considered forbidden on religious grounds, came to be suspected as unwholesome and uneateable. Moreover, in the middle ages, when animals were generally numerous in proportion to the population, and food was plentiful, necessity did not indicate the advantage of employing the horse and ox otherwise than for those purposes to which they at first sight seemed by nature best adapted—the strong, lean, and active horse for draught, and the fat, sluggish ox for meat. Quite in our own day yet another cause for the aversion to horse-meat may be found in the sentimentalism engendered by the horse himself, which, by inducing many to proclaim him "the friend of man" and "our faithful servant," has invested him with a special protection.

In the far north, however, the sturdy Icelander defied the sovereign Pontiff. Neither the authority of Gregory, Zachary, nor even the command of the Apostles "to abstain from meat offered to idols, and from blood," to which the missionaries pointed, could prevail against the strong attachment of these people to the customs of their forefathers. They were willing to be Christians, but insisted on remaining hippophagists, and in the year 1000 they triumphantly proclaimed that "all Icelanders should be baptised and adore the same God, continuing to expose babies and eat horse-flesh;" till at length the Popes, considering the case hopeless, yielded, and to this nation alone baptism was accorded with permission to eat the "execrable" food, a permission the Icelanders avail themselves of to the present day.

But even in Italy the meat was used long after the time of Zachary. At a council held in the year 787, under the presidency of Gregory, Bishop of Ostia, the faithful were exhorted in these words: "Many among you eat horses, which is not done by any Christians in the East. Avoid this." And in England, somewhat later, Egbert, Archbishop of York, told his flock that "horse-flesh was not prohibited, though many families would not buy it."

In 1629, a tragic event in the annals of Hippophagy occurred in France. A groom named Claude Guillon, was condemned to death and executed for having eaten part of a horse at Saint-Claude on a Saturday in Lent. As a contrast to which it is worth mentioning that on the 27th of February, 1848, the Parisian insurgents cut up, distributed, and ate a horse which fell dead on the pavement during the combat.

The History of Hippophagy in France.

Géraud, the distinguished physician, was the first who advocated the use of horse-flesh—or, as I propose henceforward to call it, *chevaline*—in France. In 1786, he demanded that the meat should be publicly sold, and told his countrymen a large supply of good provision was wasted. Huzard, whose authority is unimpeachable, tells us, that during six months in 1793-1794, "une partie de la viande consommée à Paris provenait de chevaux abattus, et il n'en résulta pas le moindre inconvénient, même pour ceux qui en firent un usage continuel. Quelques particuliers, il est vrai, ayant découvert l'origine de cette viande (qu'ils avaient prise, jusque-là, pour de la viande de bœuf) firent quelques plaintes qui furent consignées dans les procès-verbaux des commissaires de police; mais aucun ne parle de maladies ou même d'indispositions occasionnées par cette nourriture." In 1811, a commission, composed of Cadet, Pariset, and Parmentier, was appointed by the Board of Health, to consider the advantage of allowing horses to be used for food, and they unanimously recommended that the meat should be sold in special places, after being examined and certified as sound by capable inspectors. Parmentier, I may observe, was the minister who, with the assistance of Louis XVI., overcame the prejudice of two hundred years' standing entertained by the French against the potato, and though an octogenarian in 1811, had been placed on this commission on account of his celebrity and popularity. In 1813 Marc said—"Why do we abstain from an aliment as wholesome and savoury as any other meat, and which would be a great resource for armies?" The French Government, did not, however, feel strong enough to encounter the opposition which they knew a decree establishing chevaline as an article of food would provoke; and an anecdote told of an incident which happened a few years later well shows how inveterate the prejudice at that time was supposed to be. Richerand, the eminent surgeon, and Brillat-Savarin were dining together in Paris about the year 1825, when the latter related that a short time before he had been entertained at the house of a former officer of the Grand Army, who announced, after regaling his friends with excellent meat, dressed in various ways, that the dishes were all made of the flesh of a horse whom a recent accident had crippled for life; the host adding, that having acquired a taste for the meat during the campaign in Russia, and thinking it a pity so much excellent food should be wasted, he had for that reason ventured on this little experiment. "Et pourquoi," said Richerand to Brillat-Savarin, "n'avez vous pas ajouté cette anecdote à celles qui émaillent votre charmant petit livre?" "Docteur," replied Brillat-Savarin, "vous connaissez mieux que moi le préjugé qui retarde l'usage alimentaire de cette viande; préjugé que je n'étais pas assez fort pour oser attaquer; à vous, M. le Professeur, tirez le premier!" But in spite of this appeal Richerand declined to commence the attack, although his "Traité des Erreurs et Préjugés en Hygiène" afforded him an opportunity.

The first serious step to remove the prejudice against chevaline in France was taken, however, in 1825, when the Prefect of Police appointed a commission of six most celebrated and competent men to examine the question. Parent Duchâtelet presided over their deliberations, and their report, signed and approved by all in 1826, contained these memorable passages:—"Nous ne pouvons disconvenir que cette chair ne soit fort bonne et fort savoureuse; plusieurs membres de la commission en ont mangé, et ils n'ont pas trouvé qu'il existât entre elle et celle du bœuf une différence sensible." "Cette nourriture était très bonne et très recherchée dans les temps reculés. Elle n'a pas changé de nature, et elle convient autant aux estomacs de nos contemporains qu'à ceux de nos ancêtres." "Non pas seulement;" the report continues, "aux estomacs forts et robustes, mais encore aux malades et aux blessés ordinaires, dont elle répare les forces et consolide la convalescence." In short chevaline furnishes "des substances alimentaires saines abondantes et à vil prix." Yet the commission, so far from being composed of enthusiastic hippophagists, contained a majority of those who shared the popular prejudice.

At this time Larrey, a man of high renown among his countrymen, took the question up. As chief of the medical staff during the Russian campaign, his experience in military hospitals and on battle-fields probably exceeded that of any surgeon before or since, and his experiments rendered his opinion of the greatest value. Writing in 1827, he said—"J'ai fort souvent fait faire usage de la chair des chevaux avec le plus grand succès, aux soldats et aux blessés de nos armées. Dans quelques-unes de nos campagnes du Rhin, de la Catalogne, et des Alpes Maritimes, j'en ai fait donner en plusieurs circonstances à nos soldats; mais c'est surtout pendant le siége d'Alexandrie, en Egypte, qu'on a tiré de cette viande un parti extrêmement avantageux. Non seulement elle a conservé la vie aux troupes qui ont défendu cette ville, mais encore elle a puissamment concouru à la guérison et au rétablissement des malades et blessés que nous avions en grand nombre dans les hôpitaux. Elle a de même contribué à faire disparaître une épidémie scorbutique qui s'était emparée de toute l'armée. On faisait journellement des distributions regulières de cette viande, et fort heureusement que le nombre des chevaux a suffi pour conduire l'armée jusqu'à l'époque de la capitulation. . . . . . Je fus le premier à faire tuer mes chevaux, et à manger de cette viande. Après la bataille d'Eslingen (1809), isolé dans l'île de Lobau, avec la majeure partie de l'armée Française et environ six milles blessés . . . je fis faire de la soupe avec la chair d'une assez grande quantité de chevaux dispersés dans cette île. . . . . Tous nos soldats trouvèrent cette viande et ce bouillon d'une très bonne qualité. Le Maréchal Masséna, commandant en chef des troupes, se trouva fort heureux de partager mon repas, et en parut fort satisfait. Ainsi l'expérience démontre que l'usage de la viande de cheval est très convenable pour la nourriture de l'homme." In remembrance of Larrey's soup on the island of Lobau, Masséna used afterwards to have horse-soup on his table in Paris, and Larrey was his guest.

Scarcely less important services to the cause of Hippophagy were rendered by the MM. Villeroy, who published a complete treatise on the whole subject in the "Memoirs of the Academy of Metz," 1830. Five years later (1835) Parent-Duchâtelet, called the Howard of France, in conjunction with two coadjutors appointed by the Board of Health, presented a second report, confirming the views expressed in the first; and from that time to the present a host of Frenchmen, celebrated in science, medicine, and literature, one after the other, have recorded their opinion in favour of using horses for food, and have strongly denounced the prevailing prejudice. Among them may be mentioned Richard (Du Cantal), Guerrier de Dumast, Séguier, Amédée Latour, Dureau de la Malle, Pouchet, Auzias-Turenne, Orfila, St. Hilaire, Lavocat, Renault, Lortet, De Valmer, Barral, Montalembert, G. Decroix, Baron Cloquet, Dr. Blatin, and Milne Edwards. Lastly, if it be urged that the opinion of one practical gourmet, gastronomist, or cook be worth more than that of a dozen scientific men with undiscriminating palates, Chevet, the prince of *chefs*, declared in 1856 that " quant à la question de la qualité de la viande de cheval, elle est bonne à la nourriture de l'homme."

But contemporaneously with what may be termed the literary assault upon the prejudice in France, with such weapons as lectures, pamphlets, books, and reports, more convincing proofs of the soundness of hippophagist views were exhibited to the public. Horse-dinners were given throughout the country. M. Renault, director of the great veterinary school of Alfort, near Paris, set the example. On the 1st of December, 1855, he invited eleven professional men to dine on a paralytic horse twenty-three years old, and at the conclusion of the repast the company unanimously agreed that the soup was " supérieur, et qu'il est impossible d'en distinguer le goût du goût des consommés de bœuf;" that the boiled horse was " bon et très mangeable; and that the roast horse was so " exquis " that nothing could be " plus fin, plus délicat, ou plus tendre." A fortnight later M. Lavocat, professor of anatomy, gave a similar dinner at Toulouse with success, the horse being seventeen years old, and worth only seventeen francs. Immediately afterwards a dinner, organised by Dr. Munaret, the physiologist, took place at Lyons; and St. Hilaire repeatedly assembled private parties of friends to eat chevaline in his house at Paris. Chevet likewise aroused much curiosity in the capital in 1858 by a dinner given to sixteen literary and scientific gentlemen, and concerning which the editor of the *Constitutionnel* wrote in these terms:—" Le bouillon de cheval avait un petit goût de poule fort agréable; le filet rappelait le chevreuil; il y avait une terrine à nulle autre pareille. On y servait encore des petits pâtés à la moelle de cheval qui avaient un grand mérite." In Algiers, the Society of Medicine, on the 5th of July, 1861, passed resolutions in favour of establishing the sale of chevaline, and eighty of the principal inhabitants attended a grand banquet. Also about this time M. Decroix, at present first veterinary surgeon to the Guard of Paris, called in France the apostle of hippophagy, commenced the persevering efforts in the cause which, more than those of any living Frenchman, contributed to the success ultimately attained. Amongst other steps taken by him he offered to give 200 francs to any one opening a horse-restaurant, and 300 francs to whoever would open a horse-butcher's shop, and at the same time he distributed a series of admirable pamphlets on the *viande de cheval* adapted for all classes of readers. It was, indeed, time that an open sale should be permitted, unless a dangerous clandestine trade was to be connived at; for the Parisian poor, both aware of the excellence of the meat and attracted by its cheapness, were already selling and eating the new aliment, and, through the denunciation of an informer, four persons were imprisoned in 1864 for having substituted chevaline for beef.

It is, however, possible that even the energy of M. Decroix and the labours of St. Hilaire would have failed in attracting the notice of the Government had not another method been adopted. On the 6th of February, 1865, a magnificent banquet took place at the Grand Hotel, to which 129 of the most distinguished literary and scientific men at the time in Paris subscribed and came; including 24 physicians, 8 veterinary surgeons, 16 editors, and men of mark in all the learned professions. Three horses were eaten; one 11 years old, costing 35 francs; a second, 18 years old, costing 20 francs; and a third 22 years old, costing 40 francs; moreover, that it might not be said " La sauce fait manger le poisson," the animals were killed immediately after being bought, and when slaughtered were in such a state of extreme emaciation that the fat of all three did not even yield the quantity required to cook the dinner. The success attained being complete, and the public thereby prepared for an alteration in the law, M. Pietri, the Prefect, then felt justified in asking the Emperor's permission to sign a decree allowing horses to be sold for food. " Signez, M. le Préfet," humorously replied His Majesty, " c'est un pas vers la vie à bon marché."

Accordingly, on the 9th of June, 1866, a decree legalised the slaughter of horses in special abattoirs, and the sale of the meat for human food, with certain severe restrictions. To celebrate this victory the Parisians, on the 9th of July, 1866, gave a second grand banquet upon a still more splendid scale than that of 1865. No less than 180 visitors attended, and M. de Quatrefages, as on the former occasion, took the chair. It is, however, impossible for me to enumerate here the roll of distinguished names amongst this company. Suffice it to say that the literature, science, and art of France were adequately represented.

All impediments being now removed, a man named Antoine opened the first horse-butcher's shop in Paris, at 3, Place d'Italie, and his neighbour, a publican, started in business at the same time as horse-restaurateur, with the following advertisement on an immense cloth outside his house:—" Beefsteak et consommé de cheval. Bouillon et viande 20 centimes." He meant horse-steak, but the working classes sympathised with his literary difficulty and patronised his restaurant extensively notwithstanding. Since that period twenty-three shops have been established, and are at present (March, 1868) carrying on a brisk trade. Horse-restaurants, however, there are none; the difficulty being to meet with men possessed of sufficient capital who are willing to embark in a speculation which, while it would not be more profitable than that of an ordinary restaurant, would probably be a more precarious investment.

During the first twelve months 2,312 horses were eaten in Paris, and it is a remarkable fact that not one of the number, on the second inspection after death, proved to be in an unhealthy condition. Rollin and Co. are at present the largest purveyors of horses for food. In their stables sixty animals can be accommodated at once, and they have extensive pasturage land adjoining. By aid of a steam engine sausages are made by them which, at the last competition, were adjudged equal to those of Arles, and the very lean horses fit for this purpose are now termed " saucissons " while yet alive.

Thus eighty years elapsed since Géraud first declared that chevaline was good food for man, and it required thirty-one years of incessant agitation to obtain from the Government the authorisation of the sale in France. Yet probably no nation had learnt by more bitter experience the wholesomeness and the value of the meat which, on account of a mere prejudice, it annually wasted. At Genoa, in 1800, when Marshal Masséna was blockaded by the English and Austrians; at Hamburg, in 1813, when Davoust was attacked by the allies; at the siege of San Sebastian, in the same year; and in the retreat from Moscow, when scarcely a man would have returned alive had they not fed upon their horses—on all these occasions the French must have been compelled to admit that, even under the most disadvantageous circumstances, the food which saved them was neither repulsive nor injurious.

The History of Hippophagy in Other Countries.

Turning now from France we find that chevaline is used for food in no less than fifteen other States; the date of the legal decree authorising the sale in each being as follows:—

Iceland	always	Saxony	1847
Russia	always	Austria	,,
Denmark	1807	Belgium	,,
Wurtemburg	1841	Switzerland	1853
Bavaria	1842	Prussia	,,
Baden	1846	Norway	1855
Hanover	1847	Sweden	
Bohemia	,,		

The Icelanders alone, among European nations possessed of an historical antiquity, have never been deterred from hippophagy, and it has been practised among them continuously since the eighth century. As I have already mentioned, even the anathemas of the Supreme Pontiff were entirely disregarded.

In Denmark the people returned to the custom of their forefathers as long ago as 1807, and strange to say, the English were the cause of this step on their part, for during the siege of Copenhagen in that year, provisions were so scarce that the Danish Government had temporarily been obliged to authorise the sale of chevaline, and when peace ensued the inhabitants declined to abandon their newly-acquired delicacy. The Danish regulations are curious. After the veterinary inspector has examined an animal destined for food and certified it to be sound, he stamps a mark on each of the four hoofs, and when the carcass is cut up, one of these must remain attached to each quarter, thus affording buyers a sure guarantee of the soundness of the meat they purchase. In the Danish gaols the prisoners are fed upon chevaline, and it is sold boiled, roasted, salted, and as sausages.

The re-establishment of hippophagy in the German States is due to the Munich Society for the Protection of Animals. Committees organised banquets throughout the country, and the practical German mind heartily responded to the appeal. At Königsbaden, near Stuttgart, 150 persons dined together on the new meat in 1842, and no less than 200 at Detmold in 1847, in which latter year Hanover, which appropriately exhibits a white horse on its armorial bearings, issued many licenses for horse-abattoirs. At Vienna public opinion seems to be somewhat unstable, for in 1853 an *émeute* took place to prevent a dinner, while in 1854, 32,000 lbs. were sold in a fortnight, and it was estimated than 10,000 of the inhabitants eat no other meat. In 1863 the horses sold numbered 1,954. Berlin consumed 1,507 horses in 1865, and there were already five abattoirs in 1853.

Perhaps the most extensive hippophagist business in any country is carried on in Belgium. In Ghent the manufacture of sausages—first called Boulogne, and then Bologna—employs many workmen, and at Vilvorde, near Brussels, the meat of all animals, including the horse, is sold in the same shops. I may mention, that there are two systems of sale practised on the Continent; that of Germany and France, where chevaline must be sold in a special shop; and that of Denmark and Belgium, where it is vended by the ordinary butchers. I think the former is the better plan, unless the Danish custom of marking the hoofs is enforced.

I believe the only European countries where horses are not used for food with the open sanction of the law, are Holland, Portugal, Turkey, Greece, Spain, Italy, and the United Kingdom. Concerning the four first I have no information, but in Spain, horses killed in bull-fights were eaten till quite recently, and during the Peninsular war the Spaniards commonly were hippophagists. The southern Italians, also, in several districts, preserve strips of the meat by drying them in the sun.

Among the civilised nations of the world there now remains but one great country where either prejudice is so strong or ignorance so great that the flesh of the horse is looked upon as carrion and excites disgust. Are we, however, to assume, that because we shudder at the idea of such food, it is never eaten by us? May not the wish be father to the thought? Without questioning the genuineness of various kinds of foreign sausages, tongues, pies, and preserved meats, which we consume in large quantities, it is at least somewhat startling to find that every week in London alone, about 200,000 lbs. of chevaline free from bone dissappears; and by no means reassuring to know that the quantity bought by purveyors to the feline and canine species does not correspond to the total somehow disposed of. Where does the meat go? It is not sent out of town, and none is thrown away, for no distinction is made between the meat of sound and diseased animals. The Zoological Gardens use on an average 2,361 lbs. a week, an imperceptible fraction of the quantity missing. Moreover, it would be strange in itself if among the large number of poor in our metropolis hunger had as yet disclosed to none the truth of Larrey's words, "that horseflesh is very good food to nourish man." If others are convinced that horses, both sound and unsound, are not used for food in England, while I congratulate them on their firm faith, based, however, on supposition only, I must, at the same time, candidly confess that my investigations and knowledge induce me to entertain an entirely different opinion.

The Characteristics of Chevaline.

There is no important difference between the meat of the horse and that of any other animal used for food. It contains the same salts almost in the same proportions, and the same chemical elements. There is nothing in the blood or the juices throughout the body of an unusual character. The chief distinction between chevaline and beef is that the former contains more of the nitrogenous substance called creatine, discovered in 1833 in beef-tea, than the latter. Liebig, speaking of this creatine, which is present in nearly all vertebrates, attributes to it a "great part in the vital action." He found that while 220 lbs. of chevaline contained two ounces and a third of creatine, there were only two ounces in the same weight of beef. The German physiologist, Moleschott, a high authority on such matters, agrees in opinion with Liebig, and other men of science have declared that the meat is richer than beef in "nutritious soluble azotes." Even the ancients seem to have had some suspicion of this fact, for Hippocrates, the Father of Medicine, who lived in the fifth century B.C., after saying beef is indigestible,, tells us "horseflesh is lighter." But whether, as Liebig affirms, there be an excess of creatine, or, as other chemists assert, an unusual quantity of nutritious soluble azotes, or only the "osmazome" spoken of by Larrey, it is clear that there is some mysterious substance present which is considered by all to add to the nourishing properties of the meat; and when, as has been shown, Larrey found it so admirably adapted to the cure of the sick and wounded, one finds it difficult to believe it can be unwholesome for others.

If an ordinary observer were to compare the same joints from a horse and an ox, he would scarcely detect any difference, except that the former was leaner. The horse, passing his life in a constant state of training, and his health being dependent on his enjoying continual exercise, cannot be fattened like a bullock and remain well. The little fat in him is also of a different nature, for though harder when raw, it melts at a temperature of about 70 degrees, and forms an oil which, when strained, is excellent for frying.

Chevaline strongly resembles beef; when fresh it is scarcely to be distinguished, but after a short time may be recognised by becoming darker. There is a slight difference in the scent, and a peculiar, but by no means unpleasant, taste after it is cooked, which cannot easily be described. Writers have compared it to game, chevreuil, and venison, though, for my part, I think the flavour depends much upon the age of the animal, an old horse yielding meat with a more decided taste than a young one. When slices are cut with the grain they outwardly resemble hare, but when cut transversely they might readily be mistaken for fillet of beef. The inferior portions of an old horse are harder than those of a young ox, and I have no hesitation in admitting that all chevaline requires about one-sixth or occasionally even one-quarter longer cooking than beef. For soup no meat answers better; in fact, I think it superior to any other, notwithstanding that it will be found a little troublesome to remove the surface oil, which, unlike the grease in any ordinary *consommé*, does not cake when cold. My opinion is that the meat of an old horse, though not less wholesome, is less palatable than that of a prime four-year-old ox, but that the best parts of a young horse are superior to any beef; however, *de gustibus non disputandum*, and it really depends upon whether you prefer a rich tasteless food, or one of a drier and more marked character. It has been asserted that chevaline will keep an unusual length of time, but the opinions of those competent to judge are at issue on this point. In the experiments I have made, the horse has always been victorious over the ox; but I attach little importance to such trials, as, without incurring great expense, it is impossible to obtain meat from two animals which can fairly be compared.

The Objections to Hippophagy.

The principal objections made to the use of chevaline as food are seven in number:—

1. *That, on account of the value of a horse, only old or diseased animals would be killed.*—The first part of the objection, that the horses would be old, is only valid on the assumption that they are therefore worse, but I decline to allow that anyone has a right to assume on theory that which is abundantly disproved by fact. The flesh of a horse does not harden like that of a bullock. At all the horse-dinners, both in France and England, old animals have been eaten, and found sufficiently tender. I do not assert that the meat of an aged horse is equal to prime beef, but I do fearlessly say that an old horse is far better eating than an old ox, and that the meat is preferable to much of the beef one finds on private tables. M. Leblanc, of the Imperial Academy of Medicine, expresses the truth when he says, "Vieux bœuf, mauvaise viande; vieux cheval, bonne viande." My objectors always compare old chevaline with young beef, or the superiority of the former would be much more apparent. Neither is there any real advantage in meat being from a young animal; for, although whiter and more tender, it is far less nutritious, and that which is produced slowly and naturally is better for food than that which is formed by quick and artificial fattening. The average life of a horse extends to twelve years, consequently the horses which I used at the dinners on the 19th of December, 1867, and the 6th of February, 1868, being respectively 18, 20, 22, and 23 years old, had long passed the age at which we should expect to procure a supply for general consumption.

The force of the second part of the objection, that if the horses were not old we should at least be compelled to use those which were diseased, is not very clear. Why should we slaughter diseased horses more than diseased oxen? We inspect the latter—I fear in a very careless way—and I would inspect the former stringently. The diseases to which cattle are liable are quite as common as those peculiar to horses, and far more difficult to recognise, yet no one fears to eat meat on that account. In Paris it is actually safer to eat *viande de cheval* than any other animal food; for while beef, mutton, and pork, as in England, only pass through a very superficial inspection, the former is much more minutely looked after. Every horse destined for consumption is first examined by the Government veterinary inspector before being allowed to proceed to the abattoir; after death the carcass is again inspected, lest there should be internal disease; and finally no joint is allowed to pass the *octroi*, to be taken to the butcher's shop, unless accompanied by a certificate of its soundness.

The regulations in Paris are indeed unnecessarily severe, but they were purposely framed to meet the prejudices of the poor. If in England we are satisfied with the present inspection of our meat, there would be no ground of complaint that the precautions I should adopt would be insufficient.

I regret that I cannot now discuss the question of what results would be likely to ensue if, by accident, some diseased meat were consumed. Very much misapprehension prevails on the subject, but as the public mind is more accustomed to respect time-honoured convictions than to listen to scientific evidence when it is novel, I will only say at present that larvæ capable of development into tapeworm in man have never been discovered in chevaline.

2. *That chevaline, even when sound, is unwholesome, hard, and nasty.*—Concerning the wholesomeness of the meat, are not the opinions of Liebig, Larrey, Moleschott, Parent-Duchâtelet, Brillat-Savarin, Chevet, and Francatelli sufficient? Are there not at the present time tens of thousands of human beings in Europe, and millions throughout the world, who are both hippophagists and enjoying perfect health?

Nor has the hardness of the meat anything to do with its nutritive properties. If meat is hard when we eat it, the fault is our own. In no country is there such entire ignorance of the simplest rules of the culinary art as in England, and meat will often be tough as long as we do not understand how to make it tender.

That there is a saying, "*Dure comme du cheval*," is no wonder, if we look at the circumstances in which chevaline has generally been eaten. A starving garrison perhaps at last resolves to kill their horses; and, with all their prejudices still in full vigour, they carry their purpose out. Then, with averted faces, and sick at heart, they satisfy their hunger on the spot. The most emaciated, and in every respect the worst, animals have been selected, neither rest nor time for fattening has been granted, and the meat, owing to the necessities of the case, has not even had the advantage of being hung a day or two. Would an ox be better than a horse under such conditions? Larrey relates that the soldiers in the retreat from Moscow knocked their chargers down, and ate them while the flesh was yet warm.

Chevaline, though of a firmer and more compact texture than beef or mutton, cannot be compared in this respect with pork; but neither this hardness so often spoken of, nor this closeness of grain, in any way affects the excellence of the meat, if it be kept and cooked a little longer. To those who, without experience, say it is nasty, I reply that by far the majority of those who have tasted it are of the opposite opinion.

3. *That there are so few horses we cannot afford to diminish our stock by eating them.*—England is better supplied with horses than most other countries where hippophagy is practised, and where no scarcity has resulted in consequence. Useless horses would diminish, and all those which die from accidents would be worth more money; but it is not to be supposed that the value of a horse for food would ever affect the price of sound animals required for draught. Whatever number were eaten, it is certain that for years it would not be a tenth part of those available, and therefore we need not fear. At present worn-out or injured horses are worth only 30s. to 50s.; whereas if sold for meat they would fetch £5.

4. *That butchers would be injured.*—On the contrary, their trade would be extended by the addition of a new branch. The more meat of all kinds sold the better for them. Moreover, chevaline would only supplement, not supplant, the provision we already have. The less noted among the veterinary surgeons and the knackers would, however, lose; the former because when horses were better treated there would be fewer requiring their care; and the latter because a considerable portion of the

animals now killed by them would then go to the butcher. In France the veterinary surgeons, to their honour be it said, were for humanity's sake foremost among the prime movers in obtaining the decree of 1866. It would no doubt be better if the change caused loss to no one; but any innovation which benefits the mass must always be a misfortune to the few, and though we may deplore the fact, nevertheless private interests must yield to those of the public.

5. *Objection on the ground of religion.*—We are told that the passage in Deuteronomy xix. 3—8, forbids our eating horses because they do not divide the hoof. Let us be honest, and apply the text fairly. We are there commanded to eat the goat, the pygarg, and the chamois, and are prohibited from eating the hare, the coney, swine, and all fish that have no scales. Do we carry this out in practice? Hams made from the claw-footed bear, which does not chew the cud, are sought as delicacies, and Deuteronomy is forgotten.

I regret to be obliged to answer objections of this nature; but if a Scripture warrant for eating whatever butchers will sell is required, it is easily found in the words of St. Paul—"Whatsoever is sold in the shambles, that eat, asking no questions for conscience' sake" (1 Corinthians x. 25); or in the admonition to Peter (Acts x. 13—15). The advantage, however, or the disadvantage, of eating horses, is a question to be determined by evidence and common-sense, and not one which can be settled by perverting texts of the Old Testament.

6. *Sentimental objection.*—That the horse is a "noble animal"—"the friend of man"—"our faithful servant"—and consequently that it is cannibalic to eat him. Yet no one raises his voice in favour of sheep who give us wool, or oxen that work for us in the fields. If we may not kill an animal for food when he is possessed of more than a certain amount of intelligence, what punishment ought not to be inflicted on those cruel tribes and still more cruel sportsmen who hunt the elephant and stew the monkey? Larks are commonly 2s. 6d. per dozen, and as an adjunct to our national supply of food can be of little value; but no one remembers their musical genius as a plea to spare them. But even from another point of view—that of humanity, killing horses for food may be advocated. Some will smile at the idea of kinder treatment of horses consisting in slaughtering them, but after a little reflection it will not appear so absurd. With the exception of a few pet animals who are cared for by their masters to the end of their lives, horses pass from one step of degration and misery to another, till they either fall dead upon the road, or are killed by the knacker for dogs and cats. We are apt to think of the "noble animal" as he is in his prime, and we do not recognise our "faithful servant" in the jaded beast covered with sores and wounds that slaves in a night-cab or wearily tries to drag a dust-cart. Let horses when they are past work have a brief rest before they die, treat them as if they were worth somthing, not as living carrion, and the interest of master and servant will be identical. When a horse will fetch £5 for food there will be an object in preserving him in health and good condition, and if we finally bestow upon him a sudden and painless death, we shall be rendering him a better service than by sentimentally calling him "the friend of man," while we are consigning him to every species of torture and lingering agony. All the societies for the protection of animals save our own have been in favour of hippophagy; "justice and compassion" towards the "noble animal," they say, demands it. Some sentimentalists seriously urge that if chevaline were adopted for human food the poor dogs and cats would starve. Sad may that be, but better than listening to the cry of hungry children, or the wail of famine from the sick and poor. From those who feed poodles upon fricasseed chickens one may expect a short-sighted view of human as well as of equine distress, but it will not proceed from the sensible and educated.

7. *The national prejudice.*—This is in reality the root of all the objections. Divest your objector of his artificial reasons, and you have before you simply a man with a prejudice. It is often said to me that, whether right or wrong, at all events the prejudice is so strong that it cannot be overcome, which is precisely the same as saying people are so stupid that they cannot be taught. I know that

> "On ne détruit pas si aisément
> Le préjugé ni l'habitude,'

but I should be sorry to think so badly of my countrymen as to believe they are quite insensible to reason and to fact. Other prejudices have been overcome, and why cannot this one be conquered too? The potato, for two hundred years after its introduction in France, was considered poisonous; a medical man as late as 1772, said tea was "as bad as opium;" another warned people against coffee as a drug, "black and bitter as soot;" and the Highlanders and the poor of London long persisted in rejecting rice as dried maggots. It is strange, however, that there should be a prejudice against this meat in particular, for the horse is the cleanest of animals, herbivorous, graminivorous, and most dainty in his diet. We eat as delicacies pigs, ducks, eels, lobsters, crabs, prawns, shrimps, and fish of all kinds, any of which will feed upon the corpses from a wreck or putrid offal. In India bullocks may be seen devouring garbage like swine, and even in England they are far less fastidious than horses, yet the bare idea of eating the latter is intolerable. The real cause of this is easily detected. Before the mind's eye rises the figure of the itinerant vendor, with his half-boiled, jagged lumps, and you look away with an inward prayer that the human race may never come to this. Most of us are acquainted with the appearance of that food, but not so many have seen the refuse with which thousands of the poor are nourished, and they little dream that beef and mutton may look less tempting still. That the prejudice in England is strong I admit, and it is to be regretted that some of the papers exert their influence with the poor to make it even stronger; nevertheless, let us not despair—a prejudice is but a phantom after all; attack it boldly in front and it will fly.

THE ADVANTAGES OF HIPPOPHAGY.

Besides answering the seven preceding objections, it remains for me to show that certain advantages may reasonably be expected to ensue from the use of chevaline.

1. *The privations of the poor would be diminished.*—At present the poor get very little meat, and that little consists chiefly of scraps, for which they pay about 4d. a pound. On Christmas-eve I saw a heap of odds and ends sold in small quantities at that price, which was barely fit for human food, yet prejudice prevented the purchasers from accepting the excellent joints and steaks of fresh meat which I was willing to give them. I am not surprised, for some of those who should instruct the poor, encourage them in the idea that there is enough beef and mutton in the country for everybody, and that the greediness of the upper classes alone stands in the way of an equitable division. A newspaper which is a favourite among the lower orders said recently—"Whilst there is plenty of good, wholesome, savoury food in England for its hard-working inhabitants, it is shocking to think that even the suggestion should be ventured of making the English working-man a competitor for the horses' carrion with the knacker." The writer would not tell his readers that 23,000 of our population die annually from starvation; that the quantity of meat, including bone and fat, available per head for the inhabitants of the United Kingdom, is not two ounces a day; and that the supply being necessarily unevenly divided, the majority of the poor obtain far less; whereas seven ounces a day is the minimum quantity of animal food required in our country and climate to maintain a proper condition of physical and mental activity. I should like the poor to have

their daily meat as well as their daily bread, and not only good meat, but at a reasonable price. We should be no nearer getting cheap meat, I am constantly told, even in the event of chevaline being popularised as food, for it would soon be as dear as beef. The logical deduction, however, is surely this—that if one meat fetches as much in the market as the other it must be as good, and then why should it be wasted? Either equal prices will be accompanied by equal excellence, or inferior quality will go hand in hand with cheapness. Whenever the prejudice is overcome, and chevaline is acknowledged as wholesome and nutritious, the mouldy trimmings at 4d. per pound will go to the dogs and cats, and good fresh meat will be obtainable at 2½d. to 3d. per pound instead.

2. *Millions of pounds of meat would be available for human food which are now wasted.*—There are now about 1,500,000 horses in Great Britain. Of these one-twelfth, or 125,000, annually die. Each horse would yield about 300 lbs. of meat without bone, and consequently the 125,000 would produce 37,500,000 lbs. of meat yearly, or sufficient to feed 235,107 people all the year round on the full allowance of 7 ozs. a day each, or 822,874 on the present average consumed. It will be remarked immediately that I have deducted nothing for those animals which die of disease; and I have not, because it is impossible to estimate precisely what that allowance should be. St. Hilaire and the French authorities think one-fourth is ample to take off, and they fairly say that we must not base our calculation on the number of diseased horses found in the knackers' yards of great cities, nor even on the number in the country, for few but those which are wholly unfit for anything else are sent to the slaughterer, and the humane treatment which would be the consequence of an enhanced value of old horses would banish much of the disease at present existing. Let my hearer, however, deduct what he pleases. Though I agree with the French estimate myself, let others deduct half, or even three-quarters, if they are so minded; for if one-quarter only were fit for food, would it not be worth while to give the existing average of 2 ozs. of meat a day to 205,718 people who are now starving? Some say that, though we do not eat chevaline ourselves, it is not wasted. But to this I cannot assent. A thing is wasted when not applied to the highest purpose for which it is available.

3. *Horses would be better treated in their old age.*—The condition of an old horse at present is that of ever-increasing misery. After being well kept and cared for, as soon as his powers become enfeebled he is sold to a harsher master, who values him merely for the amount of work he is able to perform. The "noble animal" becomes a mere motive power, to be strained to the utmost till death stops the machine. From one step of degradation to another the horse descends, till at last "the friend of man" becomes an object from which we turn as painful to our sight, and as if he had been born in this deplorable condition, and had not become so by the cruelty of mankind. There is no inducement now to persuade the owners of worn-out horses to treat them kindly: they look on death as an enemy gradually approaching to steal their property, and by every violent means they goad their wretched animals to fresh exertion, that they may earn a little before they die. How much better would it be for the horse were his life somewhat shortened in exchange for good treatment to the end! If his dead body represented a moderate value for food, his master would strive to keep him in health, and have an object in saving him from needless suffering. Those who think of the "faithful servant," and would protect him by their sentimentalism from sharing the fate of the ox and sheep, build their conceptions on the image of favourites as they knew them, and they shut their eyes to the picture they present when discarded from their service.

4. *Horses would yield an important supply of food to armies on a campaign.*—In every expedition many horses are disabled by accident or the enemy, and I maintain that the meat of these would be far better for troops on a march than that of the exhausted oxen following in the rear. How often do we not hear of our soldiers living upon biscuit and preserved provisions, or undergoing the severest privations for want of animal food, and yet at the same time they are wasting thousands of pounds of fresh meat, which, as regards its nutritious properties, is even to be preferred to beef! In the Crimea what suffering could have been avoided had those in authority but had the courage to eat the dead horses instead of burying them! Two French divisions, however, were wiser than ourselves, and were rewarded by health and strength accordingly. The others shared our prejudices and our starvation. I have heard it stated that animals killed suddenly without bleeding, as might happen from a shot, are unwholesome, but the assertion has no foundation in fact, for the only effect is that of rendering the meat a little darker. Whenever the authorities in the British army recognise the excellence of chevaline as food we shall hear no more of "horrible and heartrending" famine decimating our soldiers.

5. *Education will be advanced in England.*—The hope of enlightening those who live in the shadow of ignorance, and are wedded to a prejudice, is of itself sufficient reason for those to persevere who are at all able to assist in establishing the truth. It is indeed important that the poor should have more and better food, but scarcely less necessary that a great nation should judge all things dispassionately according to the weight of evidence adduced, and abstain from hazarding strong opinions as mere prejudice may prompt. Yet in England we see the curious spectacle of a whole people clinging obstinately to an antipathy for which there is no real cause, and declining either to examine for themselves or to admit the validity of the researches of others. On a recent occasion I explained this question to 1,000 English workmen, and offered to give them meat gratis as long as my supply lasted. Out of that 1,000 men seven applied to me. If chevaline were as uneatable and unwholesome as its worst opponents declare it to be, the position taken up by many would be no more defensible, for they do not know that the meat is bad, having never tried it themselves, and they can show no testimony to confirm their assertions. When they will listen to argument, and pass an honest judgment after actual experiment, they will be better entitled to differ if they please from all that the long catalogue of great men in Europe have proclaimed on this subject.

I regret that the limits of a paper will not permit me to state the results which have followed the agitation of this question in England since October, 1867. I can only say that the prejudice exists far more strongly among two classes than any others; first, among mercantile people, and, second, among mechanics earning six shillings a day. The former are possessed with an antipathy amounting almost to mania; and the latter owing to the counsels of certain cheap weekly papers, think they are being cheated by the rich, in order that they may secure all the beef for themselves. Professional men of every kind, excepting doctors and artists, have generally been willing to listen if not to taste; and the very poor—perhaps owing to their distress—have usually received with gratitude all the chevaline I could distribute.

On one point we should probably all agree—that meat, especially in temperate climates, is necessary for man, and that there is not enough for our present population. The difference of opinion is only on the means by which the quantity may be increased. To me it seems that there are four principal methods of attaining that result:—1. By increasing our live stock, working our fisheries more effectually, and importing more largely from abroad. 2. By procuring preserved meat from countries where cattle are in excess. 3. By acclimatising new animals. 4. By using chevaline. And the wisest course, I think, is to adopt all these plans, for even then we shall not have arrived at such prosperity as to be able to give every inhabitant of the United Kingdom daily seven ounces of meat. I especially advocate the use of chevaline because it alone appears to be able to render immediate and important aid. Years would have to elapse before our cattle could be materially increased, even were the necessary capital forthcoming. Fish will not entirely supply the place of animal food; and imported meat, whether fresh or preserved, will never be cheap. Some time perhaps new species of animals may be acclimatised, but the one eland offered for sale at fifty guineas, last December, does not lead us to expect at present in that direction much food for the million.

In our horses, however, we have at hand, and ready for use, a supply of fresh meat equal to about $\frac{1}{47}$ of the whole quantity annually consumed in Great Britain; meat, moreover, which is not only wholesome but excellent, and which could be sold at less than half the price of beef. If I am asked how I propose to persuade people to lay aside their prejudices, and assist in obtaining a sale of this new article of food, I reply that we must first set an example to those below us in station by eating it ourselves, for we cannot expect the poor to eat that which we reject; and next we must endeavour to establish authorised slaughter-houses and strict inspection as at Paris. It is also much to be wished that the Society for the Protection of Animals—the only one in Europe, I repeat, that has not given its adhesion to hippophagy—would interest itself in the matter.

My desire is not to produce a new flavour for gourmets, even were chevaline delicate enough to earn for me their gratitude in this respect, but to aid, as far as I am able, in effecting these objects:—

1. That millions of pounds of good meat may not be wasted.
2. That the poor may have more and better food.
3. That horses may be more humanely treated in their old age.
4. That a national prejudice may be overcome, and education advanced—in short, I trust I may with modesty say that my wish is to do good.

An immense quantity of chevaline now passes for beef, and I should like to see it sold openly under its true name, and the purchasers protected by the safeguards of the law. I also desire that the poor of England may be better nourished as regards their bodies, better instructed as regards their minds. National prejudices should not exist in great countries, and it seems to me the duty of everybody to assist in putting them down.

The question is not whether chevaline is as good as beef or mutton—for the poor get little of either—nor whether it tastes like one thing or another—"with a far-away echo of game"—but whether it is fit or unfit for human food. "Why," in the words of a great man who laboured successfully in this cause, "should millions of pounds of excellent meat be wasted, when there are millions of men who cannot obtain it?"

Against this, as against all other innovations which run counter to established prejudices, ridicule and misrepresentation are freely used; but some will always judge dispassionately for themselves, and to those I say with confidence—test this meat fairly, and see whether you do not find it tolerable—nay, more, unexceptionable food. To-day many will laugh at the bare notion of feeding human beings upon horses, but does it not often happen that those who laugh at novelties to-day are the very first to bless them to-morrow?

DISCUSSION.

Mr. Botly said they were much obliged to any gentleman who brought forward anything which might afford a new supply of food. If there were any veterinary surgeon present, however, he should like to know whether what he understood Mr. Bicknell to say was correct—that glanders was not a contagious disease, for he knew a gentleman in Wiltshire who lost the whole of his horses through one glandered animal coming amongst them, and he also knew an instance where a human being had taken the disease and died?

Mr. Field (President of the Royal Veterinary College) thought the last speaker had rather misunderstood what Mr. Bicknell had said. There was no doubt as to glanders being highly contagious, and he had understood that Mr. Bicknell had not said the contrary; all he had asserted was that the flesh of a glandered horse, if eaten, would not be injurious.

Mr. S. Sidney said there could not be the least doubt, from what he knew previously, as well as from the evidence now adduced, that horseflesh was not unwholesome, but a food that could be resorted to if no other could be got. He had had experience in eating horse-meat, both before the recent agitation on the subject and since, when it was cooked in a simple manner. He did not think it was fair to introduce it dressed by a French cook, who could make an excellent dinner out of an old shoe. The whole question fell to the ground as regarded the working classes, if it were necessary that the meat should be treated in that way. The horse was inferior to the animals which were generally eaten, because it was an active animal; as long as the horse was worked as at present, and lived an active life, his flesh would not be so good as that of an ox or a sheep, which was well fed and never worked. The only object of introducing horse-meat would be as a matter of economy; but those who enjoyed an ordinary income were able to pay 7d., 8d., or even 10d. for their meat. He did not pay the slightest attention to the testimony of the numerous foreign witnesses who were brought forward in favour of eating horse. On the Continent they really did not know the difference between good meat and bad. The kind of beef they had in England came from an animal which never did any work in its life; which was all the summer in a nice grass field, and was then finished off in the winter with hay and roots, and perhaps a little cake. But the life of an ordinary beast on the Continent was very different; it worked hard, and its meat was consequently inferior. Therefore the Continentals being so learned in cookery, and so ignorant in meat, he did not think they were good authorities on the question. They must all sympathise with the philanthropic motives of a gentleman like Mr. Bicknell, who endeavoured to bring forward any plan of supplying more food to the labouring classes, but he entirely distrusted the figures which had been given of 23,000 persons having died of starvation. There was a workhouse in every parish, and more than one relieving officer, besides a large amount of private charity throughout the whole kingdom, and all he would say was that if these persons died of starvation, it must be because they refused to ask assistance. He did not believe in persons dying from starvation, unless in very exceptional cases. He thought that mechanics who earned 6d., 7d., or 8d. an hour would not eat horse-flesh as long as they could afford to buy beef and mutton. If they could not buy the high-priced pieces they were not confined to them, and he thought Mr. Bicknell had been rather unfortunate in the market he had gone to by his description of what was sold at 4d. per lb. At the East-end there was a large quantity of merino mutton, which would not do for a west-end club, but which, properly cooked, made very good food, and it was sold for a reasonable price. He quite agreed that our working classes were exceedingly ill-fed in a number of instances, but a great deal of that was owing to bad cooking. He would therefore suggest that if attention were paid to affording some instruction in the art of good cookery to the lower classes, a great deal of good might be accomplished.

Mr. W. L. Scott said he had supplied Mr. Bicknell with the figures with reference to the number of persons who died from starvation, and he wished to explain that he referred to those whose lives were shortened because they had not food enough. The remark as to the defective state of English cookery was very important; but still the fact remained, there was a certain number of animals, producing a certain number of pounds of meat, killed every year, and there was a certain number imported; and even if all this were properly cooked, there was not enough animal food for the people. He had pursued some independent inquiries with regard to the question of using horsemeat for food, and he did not find the same difference as Mr. Bicknell had between the amount slaughtered and that accounted for. In round numbers, there were 1,300 cats' meat men, but who preferred to be called "carriers" in London, and their vocation was to feed something like 150,000 dogs, and 250,000 cats. He believed he was correct in saying that about 46,000 horses were annually slaughtered in London, many being brought up from the country on purpose by contract; the prices being from 15s. to 55s. each. Allowing 250 lbs. of dog's-meat to be produced from each horse, there would be about 11½ million lbs. as a total. On inquiry as to each carrier's daily average, he found that the total amount sold did not very largely differ from this. His analysis of horse-meat did not show the same amount of creatine as was given by Liebig; perhaps, however, Liebig had not taken the best quality of beef, and had very superior horse-meat to compare with it. He had taken ordinary beef, and as good horse as he could get, and the figures he got were 1·3 per cent. of creatine in beef, and not quite ·9 per cent. in horse-meat.

Mr. **HYDE CLARKE** said he was not aware that there was any necessity for legalising the sale of horseflesh in Turkey, because there was no prohibition; nor was it the fact that the Turks would eat anything. There was in that country an inspector of markets in most towns, and likewise a legalised tariff, similar to the assize of bread which used to exist in England; that tariff only included beef and mutton, although other articles were sold. Buffalo and camel flesh were used to a considerable extent in some parts of Turkey, but he could not say whether this was the case with horseflesh, though it was certain there was no prohibition. He thought the advocates of this movement would comply more with the public taste if they spoke of horse-meat instead of horseflesh.

Mr. **KERNAGHAN** had heard that evening for the first time a discussion on this subject, and his opinion was that the reader of the paper had stated a great many arguments in favour of the use of horse-meat, but he had heard no arguments to the contrary. The question must resolve itself into this—Was horseflesh good for food or was it bad? If it was bad, by no means adopt it, but if it was good, he saw no reason why it should not be used. Mr. Sidney had referred to the excellence of the continental cookery, but that had nothing to do with the question, and he thought the tendency of that gentleman's observations was rather in favour of utilising this new kind of meat, because he said that by this mode of cookery it could be made available in a manner and to an extent to which it could not be made available by English cookery. That was simply a great reason why such a system of cookery should be encouraged, and why flesh which had not hitherto been utilised should be brought into use. It was admitted that the high price of ordinary meat put it out of the power of the labouring classes to use it, and he therefore thought that every exertion should be made by persons of influence to bring before the people of this country the fact that another description of food was in existence, which had not hitherto been brought into use, and if there really was no objection to it he thought it the duty of everyone to endeavour to remove the foolish prejudice which now existed on the subject.

Mr. **WARRINER** could quite indorse what had been said by Mr. Bicknell, as to the quality of horse-meat. The first time he had tasted it was at Aldershot, where a 6-year old horse, to which an accident had happened, was killed and cooked, and the result was that the soldiers, to whom a portion was given in ignorance, did not discover the difference between it and their ordinary meat. He had also tasted it in Paris, and thought it very good. He there tasted also mule meat and donkey meat, and he gave the preference to the last. It would require a great deal of effort to break down the public prejudices in this matter. When he was sent to Ireland, at the time of the famine, at first they tried to feed the people on soup made from meat, but after the first week they were obliged to discontinue it, and substitute cereals, principally Indian meal, which was then introduced for the first time. This Indian meal had ever since remained a staple article of food, but that had only been accomplished by perseverance and good cooking. He thought the main thing wanting in England was improvement in cookery.

Mr. **KERNAGHAN**, asking permission to add a few words in explanation, said the Indian meal which had just been referred to was an instance in which prejudice had been overcome in the matter of food; and the same thing might take place with regard to horse-meat. To his own knowledge, when the Indian meal was poured into Ireland, in 1848, by tons, at a low price, persons preferred to die in the ditches rather than use it, and yet the prejudice was overcome, and it was now a staple article.

Mr. **EDWARD WILSON** said the evidence of all who had paid any attention to modifying the food of the people tended to strengthen the conviction that it was a very difficult matter to deal with, and that those who attempted such a great modification as was sought by Mr. Bicknell had entered upon a very arduous task indeed, and one which could only be accomplished by great patience and discretion. Instead of disputing as to the number of those who actually died of starvation, he thought they ought to consider the question of how far the bulk of the people were under-fed. They ought not to wait until a man dropped down dead from starvation before they tried to discover if something could not be done to improve the diet of the great bulk of the population, especially agricultural labourers. Having lived for many years in Australia, where the people were better fed than anywhere else, and where the labouring men had as much animal food as they liked, when he came back to England and saw what the people had to eat, he could not help being deeply struck with the great deficiency in animal food. They knew by statistical returns that there was not enough beef and mutton, pork, &c., to provide our artisans with animal diet, and therefore it was a matter of great interest when they were assured, on high authority, that there was a new article of flesh meat, which was wholesome, and might be made quite palatable. He thought they should look seriously at the question, and not turn aside from it too readily. There was a great deal of prejudice on the subject, which it would require very long and patient effort to break down. His own idea was that the more simple the preparation of the meat the better, and it was highly important that the nomenclature applied to the anatomy of the horse should be avoided as much as possible. He certainly should not feel his own appetite towards the meat at all increased if he found it presented, as it was at the Langham Hotel, described as "boiled withers." He did not think there would be any difficulty in giving a dinner of horse meat to a large number of men who were inclined to try it. The Crystal Palace might not assist them, and there might be difficulties with hotel keepers, but as summer came on they might hire a tent, where horse should be served up, and, by giving a little encouragement in the shape of beer, on condition of a certain quantity of the meat being eaten, he had no doubt a goodly number of diners would be attracted. He would also suggest, as another means of breaking down prejudice, that criminals in gaols, and people in workhouses, where the quantity of food was not over-abundant, should have the option of being supplied with horse meat on a larger scale than their ordinary diet, and, if it was wholesome and palatable, when they came out and mixed with their fellows, they would all be so many apostles of hippophagy.

Mr. **WOODLEY** said they had been told of the strict supervision which was exercised in France over the sale of horseflesh, but if, as Mr. Bicknell stated, a French gentleman had partaken of animals which had died of all sorts of diseases without injury, that inspection appeared to be unnecessary.

Mr. Hilton thought the last speaker had rather misunderstood the paper on the subject of diseased meat. He believed that the inspectors' supervision of meat in England only referred to the meat itself after it was killed, and in that state—whether beef, mutton, or horse—inspection would be necessary, in order to see that it had not become putrid or bad by being kept too long or from being badly packed. That was a very different thing to inspecting the animal before it was killed to see whether it was diseased. It might be said that in cats' and dogs' meat we already had horseflesh in its simplest form; but this, he believed, was the root of all the prejudice on the subject. The first thing to do was to get over the peculiar appearance which it had when prepared in this form. If a horse was cut up in joints, all the offal being trimmed off, then the prejudice would be much more easily overcome. Mr. Kernaghan had given them a notable example of how prejudice in matters of food had been overcome, and he hoped the statement made as to the number who died annually of starvation would not be treated lightly. It was too much the custom to fancy that these statements were exaggerated, but it was only those who were in the habit of going into the poorest neighbourhoods who were aware of the immense amount of suffering produced by lack of sufficient nourishment. A large number of the poor died many years before their time from this cause, and, in a certain sense, they might be said literally to die of starvation. They were told there were relieving-officers, and so on; but that was always the cry—"We have got parochial officers and workhouses, and it is quite contrary to the regulations, and very wrong for people to die:" but they did die, nevertheless. Meat was now so dear that the moment a man was out of work, or if he died, it was impossible for the family to get even the smallest portion. Then, again, the matter might be regarded in another respect. A poor man who got his living with the aid of a horse, if the poor animal broke his leg, or any other accident happened to him, so that he had to be killed, his present value was only 30s.; but if the public prejudice could be overcome, there would be available 400 or 500 lbs. of good meat, which could be distributed at a great advantage to the community, and with great benefit to the poor owner, who would get £6 or £7 for the horse. In this way, instead of poor old horses being used up to the last, as they now were, when they began to get out of condition, they would be sent to some place where they would be fatted and got ready for the butcher.

The Chairman said he had tasted horse, and it appeared to him very excellent meat, indeed, as far as his taste went, quite equal to ordinary mutton. He was not speaking of *entrées* and delicately-cooked dishes, because he quite recognised the fact that it was impossible to judge of meat otherwise than in the plain form. It had been said that the meat must be tough, because of the work which a horse underwent, but there was a proverb as to the excellence for the table of a hunted hare, and if a hare that had been hunted was so good, he did not see why the horse that had hunted it should be so bad. Such questions, therefore, could not be settled by *à priori* reasoning, but only by experience, and as far as his own experience went it was favourable. There was no necessity for all to be agreed in this matter; if some liked horse, and some liked mutton, there was no reason why each should not follow his own taste; and they had no such great variety of solid plain meat that they need reject a new kind. By the discussion on this question he was reminded of a story which was current at the time penny papers were first introduced. It was said that an old woman went to a railway station and bought a copy of the *Daily Telegraph*, and when she had read it, she said she did not see that the penny papers were a bit better than the sixpenny ones. To some extent it was the same with this matter. It was not a question whether the meat was better than beef or mutton, but whether it was a solid, sound, and wholesome substitute for it. They had heard a good deal of the question of diseased meat, and some seemed to object to the topic having been introduced. He should have been disposed to agree with this view in an ordinary way, as, although the subject might be very interesting, it was somewhat unpleasant; but bearing in mind that Mr. Bicknell was addressing a learned society, he thought he was very well advised in having spoken in the way he had. Of course, if horse-meat were introduced it would be inspected as carefully as any other kind. It seemed to him that the best way to act in this matter was to establish a shop, as a means of introducing this meat, and he would be happy to assist Mr. Bicknell in establishing one where it might be retailed to those who were disposed to buy it. He did not think, if it were a good and wholesome food, as he himself had no doubt it was, that our artisans were so stupid that they would not adopt it, if it could be sold at a much cheaper price than any meat now placed before them. It was true they were prejudiced in the matter, but as that prejudice did not rest upon any solid basis, it would soon give way. The horse was a clean feeder, and there was really not a word to be said against the use of this food; the only thing was that it was something new, and to which people were unaccustomed. Not only in Europe, but in many other parts of the world, horse-meat was an important article of food. Perhaps savages were not very good judges, but, whatever their experience might be worth, it was decidedly in favour of this meat. On all these grounds he could not help thinking that now the matter had been discussed it would be soon introduced here as well as in other parts of Europe. On these questions, however, it was very little use arguing; everyone must judge for himself, and Mr. Bicknell would invite those se present to make this practical test in the lower room, and he thought that they would come to the conclusion that there was nothing objectionable in horse-meat.

Mr. Bicknell said he would answer the objections *seriatim*, although some had been almost disposed of by the Chairman. As regarded catching disease from horses, it depended a great deal on the state of health of the person who came in contact with them. What he had meant to say with regard to glanders was, that it was not so contagious as was generally supposed, there being an idea that anyone who came in contact with a horse suffering from that disease would take it as a matter of course, but if that were the case, those who were in the habit of slaughtering horses would all have been dead, whereas no case of contagion had occurred in the largest establishment in London for the last 30 years. As regarded French cooking, at the large dinner at the Langham Hotel he had a plain joint which he thought was large enough, for it weighed 280 lbs., and many of the dishes were as plain as ordinary cooking could make them; but he did not think they could get 164 gentlemen to come and eat chops and steaks and pay a guinea and a-half for their dinner, and therefore elaborate cooking was naturally introduced on that occasion. He had always said that this meat was intended for the poor, and not as a new flavour for the rich; and, therefore, if it were slightly inferior to beef or mutton, that was no objection to it. It might be very good, although not equal to some other kinds of meat. The foreign witnesses who had been referred to he considered quite deserving of credit, and many of them had no better establishment for cooking than the ordinary workman of England. The gentleman who knew most about it had an old soldier's servant as cook. He had tried it himself in his own house in forty or fifty different ways, and there was no French cooking whatever required. When he said that 23,000 persons died of starvation annually, he did not mean, of course, that they had nothing at all to eat, but, as had been explained, that their lives were cut short by deficiency of food. It was said that mechanics would not buy horse-meat as long as they could buy beef or mutton, but the question was what they would do when they could not get beef or mutton. He did not think 4d. per lb., which he had quoted for the lowest class of meat, was exceptional, for he had visited other low neighbourhoods and found it the same, but he was told that occasionally it was sold off at 3d. late on Saturday night, in order to clear the shop. When he said the Turks would eat anything, he only spoke jestingly, and did not intend to depreciate their habits in the matter of provisions. Horseflesh had been referred to as an objectionable term, but he had used it because he thought introducing a new one would not be liked, or he should have adopted the more musical one of chevaline. Another gentleman said that if they began to eat horses there was no knowing where they would stop; they might come to guinea pigs. Now, guinea pigs were very good food; but he would not stop anywhere, but throw into consumption all that was wholesome as long as there was a deficiency in the food of the people. He had introduced the words "horse oil" into the *menu* in order to show that although the fat of the horse was not available for cooking in exactly the same way as that of other animals, still it could be applied in an equally useful and palatable manner. A large and cheap dinner for the working classes was still rather a difficult matter, on account of the enormous amount of work devolving on the person who got it up. There was even a difficulty at a first-rate hotel; and, therefore, he should require assistance before he undertook it. He should be very happy to receive names for this purpose, and was much obliged to Sir John Lubbock for his kind offer of aid in establishing a shop. The inspection in France was very complete; in the first place a veterinary surgeon examined the horse and gave him a pass to go to the *abattoir*, and when he was killed a *post-mortem* examination was made to see that there was no concealed disease, and eventually each joint sent out was certified and marked. The gentleman who had eaten all the diseased animals did so as a scientific experiment, having undertaken it at the time of the famine in Algeria, in the hope of doing good, and he now published his experience; but no one, he thought, would have supposed that this was anything but an experiment. If a horse were nicely cut up into joints he did not believe anyone would know it from beef. This was the first time he had mentioned the subject of diseased horses, but as people were always asking him about it, he thought it as well to show that even if by chance a diseased horse did get into consumption, no great harm would be done. There was in this respect one advantage in horse-meat, for the parasites which produced tapeworms did not exist in horses, although they had been discovered in beef and mutton; and a worse form of parasite, the trichina, had long been known to exist in pork. He would consider about opening a shop, but he was afraid he must wait for yet further assistance before embarking in the speculation. He had explained the subject thoroughly to a thousand men in a building yard, men above the average intellect, and offered them horse meat for nothing, but only seven came to ask for it. Among the very poor there was not quite so much prejudice, probably because of their greater necessity. It was beyond all question that the supply of meat was quite inadequate to the wants of the population, and therefore any new variety ought to be welcome.

The CHAIRMAN then proposed a vote of thanks to Mr. Bicknell, which was carried unanimously.

At the conclusion of the meeting, soup made from horse, roast joints, and sausages were served in the lower room and partaken of by those present. There was also a joint of donkey.

Mr. Wentworth L. Scott exhibited a specimen of *extractum carnis* made from horse-meat.

Proceedings of Institutions.

◆

DEVONPORT MECHANICS' INSTITUTE.—An interesting lecture on "Ghosts and Apparitions" was delivered recently in the large hall of the above institute, by Joseph Simpson, Esq., of Newport Pagnell, Secretary of the College of Lecturers, and editor of the *Institute and Lecturers' Gazette*. The tendency of the lecture was to disabuse the mind of a belief in ghosts, apparitions, and kindred superstitions. It was listened to throughout with earnest attention by a large audience, whose applause clearly evidenced their appreciation of the lecturer's arguments. This was Mr. Simpson's seventh appearance as a lecturer before the members of the Devonport Mechanics' Institute.

Notes.

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MONT CENIS TUNNEL.—During the months of January and February the progress made at the Mont Cenis tunnel was 202·25 metres, of which 130·30 metres was at the Bardonnèche, and 98·95 metres at the Modane end. Of this, the total advancement was 106·20 metres during the month of January, of which the progress at the Bardonnèche end was 54·30 metres, and 51·90 metres at Modane. In February, the total progress was 96·05 metres, of which 49 metres was at Bardonnèche, and 47.05 metres at Modane. The position of the tunnel up to the 1st of March, was as follows:—

	Metres.
South end, Bardonnèche	4·827·80
North end, Modane	3·221·10
Total length of tunnelling	8·048·90
Remaining to be done	4·171·10
Total length of tunnel	12·220·00

The following is the advancement and expenditure for each year since the commencement of this gigantic undertaking to the end of 1867. The expenditure for 1867 has not yet been published:—

Length of tunnel completed.

Date.	Bardonnèche.	Modane.	Total during year.	Total length.	Amount.
	Metres.	Metres.	Metres.	Metres.	Francs.
1857 1858	284·85	212·75	497·60	497·60	3·369·246
1859	236·35	132·75	369·10	866·70	1,630,753
1860	203·80	139·50	343·30	1,210·00	2,500,000
1861	170·00	193 00	363·00	1,573·00	3,000,000
1862	380·00	243·00	623·00	2,196·00	2,000,000
1863	426·00	376·00	802·00	2,998·00	3,500,000
1864	621·00	467·00	1,088·00	4,086·00	6,552,254
1865	765·30	458·40	1,223·70	5,309·70	5,502,738
1866	812.70	212 29	1,024·99	6,334 69	5,644,982
1867	824·50	687·46	1,511 96	7,846·65	—

The probable cost of the work was estimated at 70,000,000 francs (£2,800,000); of this amount 33,699,973 francs were expended up to the end of 1866.

Correspondence.

◆

RAILWAYS AND ROLLING STOCK.—SIR,—In reading the paper on railways by Mr. Fairlie, published in your *Journal*, I find that he attributes to Mr. James Samuel the invention of the engines and carriages or steam carriages used on the Eastern Counties and elsewhere, commencing about the year 1848. If there be any value in matters of history, the history should at least be accurate, and embody facts. Mr. Samuel was not the inventor of anything belonging to the plans; he was simply the user, and, as the resident engineer of the line, recommended them to his directors, and I am far from underrating the importance of recognition. But everything connected with plan or design, or mechanical operation, was produced at Fairfield Works, of which I was senior partner and mechanical manager. In the year 1850, I wrote a pamphlet, enlarging upon a previous article in the *Westminster Review*, in which the whole of the circumstances were recorded, and it was reviewed both in the *Times* and *Spectator* at length, and no doubt has ever been thrown on its accuracy from that time to this. I hand you a copy.* You will find therein stated all the principles involved in the disproportion of dead weight to paying weight treated at full length, as applicable to the present time, now as then. You will find, p. 13, Mr. Samuel's first application to the writer for a manumotive machine, which was constructed, and travelled at 18 miles per hour, but the beef-fed human engines struck work. Out of this grew the "Express," with 3½ in. cylinders and 6 in. stroke. But the first practical recogniser of the system was Mr. Charles Hutton Gregory, consulting engineer to the Bristol and Exeter, and now President of the Civil Engineers' Institution, who recommended his directors to order a steam carriage called the "Fairfield," on six wheels, the drivers 4 ft. 6 in., cylinders 8 in. diameter, stroke 12 in., 58 passengers, working gradient of 1 in 87, and two loaded wagons; consumption of coke 8 lbs. per mile. This was on the Great Western gauge. The next steam carriage was ordered by the directors of the Eastern Counties Railway, and called the "Enfield." It was on six wheels, the same as the Fairfield; the driving-wheels were 5 ft. in diameter; passengers 84; but another carriage, 40ft. × 9ft., was attached as the traffic increased. The Enfield weighed, in working trim, 15 tons 7 cwt.; the consumption of coke while running was under 6 lbs. per mile, and the speed 37 miles per hour. The two next engines with connected trains were ordered by Mr. Nixon, the engineer to the Cork and Bandon. The next was the "Cambridge," coupled to the train, but with four separate wheels, as it was found a difficulty to put passenger carriages into the engineering shop when repairs were wanted. Subsequently to this Mr. Hemming, the Secretary to the Londonderry and Enniskillen Railway, ordered another, which was called the "Enniskillen." This engine had 9-inch cylinders, and 15-inch stroke. The tank was beneath the boiler, holding 350 gallons of water. A similar engine, called the "Resurgam," was furnished to the St. Helen's Railway Company, by order of the Secretary, Mr. Arthur Sinclair, and another, called the "Speranza," to an Italian line. Subsequently three "twin engines," called the Gemini, were constructed for the Enniskillen line, adapted to run either singly or coupled together, built by Messrs. Kitson, and so arranged that one driver and stoker could work the pair of engines, fire-box and piston together. An engine and coupled passenger and tender vehicle was also built by Messrs. Kitson, and shown in the Exhibition of 1851. The drawing of this engine is shown in the pamphlet "Road Progress." That in the Exhibition was called the "Ariel's Girdle." There was a peculiarity about the first engine built for actual working,—the "Fairfield." It was broad-gauge, with only one pair of driving wheels in front. I considered it dangerous to use a crank axle, and undesirable, as involving great weight; but with such a width of gauge outside cylinders were preposterous. I therefore used inside cylinders, applying their power to a separate crank shaft, technically called a "dummy," and then transferring the motion to crank pins on the driving-wheels. This was, I believe, the first time that such a plan was ever put in practice, and it was found to answer very well. The Enfield was, after a time, separated from the carriage for convenience in cleaning, and put upon four wheels, and in that condition became the directors' engine for several years, because she could travel as fast as any engine on the line, with much less lumber. Subsequently, one of the directors, having read somewhere that six-wheeled engines were safer than four, insisted upon another pair of wheels being applied, which was done; but I am not aware that the running facilities were improved by the extra dead load and extra friction of the wheel base. In the days of the commencement of this system I knew nothing of Mr. Fairlie. My first acquaintance with him was his wishing to put my light system before Colonel Kennedy, the engineer of the Bombay and Baroda, and he informed me that he had had my engine, the Enniskillen, under his charge on the Coleraine line, and had re-christened it the "Fairy;" and he was full of expressions of delight at her performance as to speed and steadiness, evidently believing, like the sailor with his ship, that she could do everything but talk. How he made such a blunder as now to attribute the whole matter to Mr. Samuel, I do not well comprehend. What Mr. Samuel did was to order from Fairfield Works first a manumotive and then an inspectors' engine, with 3½ cylinders, but how they were to be made did not enter into his imagination, for none of his antecedents prepared him for it. He was extremely delighted with a new toy, and proclaimed its merits far and wide, and worked hard at getting results and statistics. A report on the subject of light engines and dead weights was about this time placed before the directors of the Eastern Counties, and this report made a considerable sensation with Mr. Samuel's name appended to it, but it did not produce an order. The first order was given to the writer by Mr. Charles Hutton Gregory. The designs were all mine, the results of previous years of thought. They were worked out in all their steam-power calculations and details by Edward Reynolds, a pupil, who was first introduced to me by Walter Hancock, the famous locomotist on common roads, as a young man of remarkable faculties, who had had been very much about him in his experiments. I never willingly pass by faculties where I can find them, for the world is not overburthened with them, and so Edward Reynolds became free of Fairfield Works as a pupil, both in the drawing office and workshops, and a very valuable assistant he was, and his subsequent career has confirmed his early promise. My foremen at the time were Archibald Sinclair and Edward Corry, the former passed away, the latter a prosperous and well-respected man in London City. All these things are matters of common knowledge, and, to a certain extent, of literary history. The pamphlet was not confined to the question of engines only. It reviewed and particularised the whole subject of engines, vehicles, trams, and permanent ways; and the *Times* of January 25th, 1850, says of the pamphlet "It also contains a number of suggestions on the general developments of traffic, which, in point of ingenuity and completeness as well as in the faith they exhibit in the extent to which the public would avail themselves of increased facilities, resemble the original Post-office plans of Mr. Rowland Hill." In looking over Mr. Fairlie's paper I find a quantity of very useful statistics about dead load and paying load proportions. But the practical remedies appear to settle themselves into one single point—the substitution for existing engines with two cylinders of an engine with four cylinders, or rather two underframe engines, with a long frame and boiler above, the engines each pivoted to the upper frame by a bogie pin, round which it swivels; the advantage being that each bogie wheel base being only ten feet in length, it will roll round curves of only two chains radius. This is precisely the principle of the timber trucks used on railways, two short trucks being connected by the long timber lying on central saddles. I am not going to criticise Mr. Fairlie's engine, but merely to theorise. I take it for granted that, with a given cylinder power, it will haul the same load as a two-cylinder engine of equal power, with the undoubted advantage of getting rid of flange friction, as compared with a long-based engine on curves, giving out more "duty" and less waste power. But if the bogie be very short in the wheel base, and badly centred, this also may involve frictions of another kind, by dragging, and keeping the axles abnormal to the curves. Thus, a 10 ft. wheel base, involving ¾ in. of versed sine on a curve of two chains radius, might involve less friction than a 5 ft. wheel base on the same curve with ¼ in. versed sine, because, in the absence of other guidance, length is an important element in steadiness, and the short base might drag askew. But Mr. Fairlie takes it for granted that, in the case of his engines—and, of course, of any other engines viewed as tank engines—by cutting off the tender the whole weight and waste of the tender is saved. Let us analyse this. The datum line from which to construct an engine, whether on six wheels, or four, or eight, is the limit of weight which may be put upon each wheel without damaging either rails or tyres to any serious extent. Beyond this limit we cannot advantageously go. Assume it to be six tons per wheel, that will give a load of 36 tons for a six-wheel engine. Assuming the adhesive load required to balance the steam to be as 5 to 1, that would give seven tons of steam power, say, a pair of 18 in. cylinders. But the engine in this condition is a mere dummy; an idiot, "full of sound and fury, signifying nothing," like Munchausen's horse with his hinder parts cut away, falling into a syncope for want of food and water. He is a trooper without his horse, a soldier without his rations, and he will die a rapid death without his tender or its equivalent. The tender weighs say 20 tons; but if taken away, the fuel and water, and tanks, and coal-bunks must be retained and placed in some form or other on the engine's back, and that will be at least 12 tons out of the 20; this added to thirty-five makes forty-eight, which gives eight tons per wheel, bringing it within the crushing limit; wherefore, it is evident that we must travel back and lighten the whole to the original 36 tons by lightening the structure, and in such case we shall have a less powerful engine, unless we assume that the present 36-ton engines are made superfluously heavy in material to the extent of 12 tons, which may be abstracted and replaced by fuel and water. The water will be 9 tons, and the fuel 30 cwt; and if we are to use tank engines with a small supply of water we can only run short distances, unless we resort to Mr. Ramsbottom's plans of picking up from level troughs along the line, against which there is only the solitary objection of frost. No doubt, other things bring equal, it is an advantage to have a long straight frame with flexible wheel bases, but it is also a very considerable advantage to have only two cylinders and two sets of gearing instead of four, because, in the one case it is simply an increase in the weight of metal, and in the other it is a duplication of workmanship and repairs—far the heaviest items. Other things being equal, a small watch costs as much as a large one as to workmanship. There is also a disadvantage in making the fuel and water constitute a part of the adhesion, because it is a diminishing quantity. If 12 tons be abstracted from 36 it leaves 24, or four tons load per wheel, equal to less than five tons of steam power instead of seven, or else the wheels would slip, unless under very favourable conditions, as to level and dry rails. There is also an advantage in what are called tank engines, that they will run either end foremost without reversing, and so facilitate traffic. But one reason for this is the bad construction and connection of the tender, which renders it dangerous to drive it before the engine, as being liable to get off the line. But there is no difficulty in so arranging the connection of the engine and tender, that they may run either end foremost without risk, and without shaking the driver on the foot-plate, as well as any tank engine. Much is claimed for the double-bogie engine, that it has a straight connection between the two pivots. But it is quite practicable so to couple two six-wheel goods engines that they will do the same thing, transmitting the force either in pushing or pulling on a straight line between the centres of the adjoining frames. Without going into the question of building new stock, there is quite enough to be done in the conversion of existing stock to frictionless movement, very materially to benefit their dividends, when once railway managers shall turn their attention to it. The normal 6lbs. per ton resistance must be multiplied many fold to account for the very small number of tons load drawn, compared with the area of the cylinders. In modern railway calculation cost is determined per mile run by the train, whether full or empty. The passengers are never considered, they are but as dirt in the balance; of no more importance to the total load than the insects which may jump on or off. One reason for this extensive growth of dead weight is to resist endlong collision, a consideration not requisite with omnibuses; but, as in ships, a larger hull carries a larger load in proportion to its displacements, so, should the widths of railway carriages increase, and the length of the train proportionally diminish, the weight and resistance would be lessened, and the paying load increased: and in proportion as frictional resistance is diminished so may new stock be constructed with less dead weight. It must be remembered that in proportion to the resistance of the train its carrying capacity diminishes, and its demand for engine power increases, and hence disproportionately heavy engines—W. BRIDGES ADAMS.

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* We have the copy before us.—*Ed. J. S. A.*

MEETINGS FOR THE ENSUING WEEK.

MON......Social Science Assoc., 8. Mr. J. B. Curgenven, "On the Extension of the Contagious Diseases Act, 1866."
R. United Service Inst., 8½. 1. Mr. James D. Dougall, "On Schultze's Granulated-Wood Gunpowder." 2. Mr. Geo. Read, R.N., "Will Explain a Model of his Helm Indicator."
British Architects, 8.
Actuaries, 7. Mr. H. W. Manly, "On a Comparison of the Values of Policies as found by means of the various Tables of Mortality, and the different methods of Valuation in use among Actuaries."
Medical, 8.
Asiatic, 3.

TUES ...Civil Engineers, 8. Mr. John Wolfe Barry, "The City Terminus Extension of the Charing-cross Railway."
Anthropological, 8.
Royal Inst., 3. Dr. M. Foster, "On the Development of Animals."

WED ...Society of Arts, 8. Mr. Raphael Brandon, "How to make Railways remunerative to the Shareholders and profitable to the State."
Pharmaceutical, 8.
Obstetrical, 8.
R. Society of Literature, 4½.

THUR ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Dr. W. Baird, "Contributions towards a Monograph of the species of Annelides belonging to the *Amphinomacea*, with a description of several new species contained in the British Museum." 2. Mr. Jas. Buckman, "The Effects of Selection in the Cultivation of Plants."
Society of Fine Arts, 8. Mr. Alfred Gilbert, "On the Classics of the Pianoforte."
Chemical, 8.
R. Society Club, 6.
Artists and Amateurs, 8.
Royal Inst., 3. Dr. M. Foster, "On the Development of Animals."

FRI.......Geologists' Assoc., 8.
Royal Inst., 8. Dr. Frankland, "On the Water Supply for the Metropolis."
Archæological Inst., 4.

SAT ......Royal Inst., 3. Professor Roscoe, "On the Non-Metallic Elements."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.	*Delivered on 17th March*, 1868.
62.	Bill—Registration of Writs (Scotland).
42. (II.)	Postal Contracts—Correspondence.
129.	Bankruptcy Court—General Return.

132. Police (Counties and Boroughs)—Correspondence.
135. Fisheries (Ireland)—Correspondence.
143. Navy—Statement of Excesses (1866-7).
144. Army—Statement of Excesses (1866-7).
145. Army—Estimate "on Account."
Ecclesiastical Commission—Twentieth Report.

Delivered on 18th March, 1868.

56. Bill—Land Writs Registration (Scotland).
123. Metropolitan Board of Works—Return.
137. Education—Report.
149. Navy—Estimate "on Account."
108. East India (Systems of Government)—Despatch.
Prison Dietaries (Ireland)—Report.
Trades Unions—Report of Examiners.
Public Petitions—Eighth Report.

Delivered on 19th March, 1868.

61. Bill—Renewable Leasehold Conversion (Ireland) Act Extension.
95. (I.) Edinburgh Churches—Supplementary Return.
141. Dublin Metropolitan Police—Abstract Account.
Ship "Mermaid"—Agreement.

Delivered on 20th March, 1868.

47. Bill—Public Schools (amended).
68. ,, Court of Appeal, Chancery (Despatch of Business) Amendment.
69. ,, Ecclesiastical Commissioners Orders in Council.
126. (I.) Committee of Selection—Second Report.
Church Estates Commission—Seventeenth Report.

Patents.

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From Commissioners of Patents' Journal, March 20.

Grants of Provisional Protection.

Bags, &c., measuring and cutting cloth for—489—C. Blyth.
Bathing dresses—654—F. Dumas.
Boilers—786—J. G. Tongue.
Bolts and nuts, screw—808—C. D. Abel.
Bolts, screw—690—E. Baker.
Boots, &c., rivets for—765—C. H. Gould.
Bricks, &c., burning—604—H. Chamberlain, J. Craven, and H. Wedekind.
Building, compositions used in—515—L. Mummenhoff.
Cans—698—R. Zwez.
Card cases—804—H. M. Lee.
Carpeting, felt—746—W. and T. Mitchell.
Carriages—369—J. Offord and S. W. Hale.
Cartridge cases—755—F. T. Baker.
Cartridge cases, filling—692—J. Collins.
Chairs, steel—623—F. Remy.
Chronometer boxes—757—J. Hammersley.
Clocks, &c., mechanical movements adapted for—571—W. E. Newton.
Coals, &c., screening—728—E. Burton and J. Lawrence.
Conveyances, &c., registering number of passengers travelling by public—693—L. C. Detouche.
Conveyances, &c., registering number of passengers travelling by public—717—F. Moss.
Copper and iron, treating—759—W. Hunt.
Cotton seed, &c., decorticating—792—H. Simmonds.
Docks, floating—788—J. Campbell.
Door handles—740—E. Clifton.
Door knobs, &c., fixing—798—J. and J. Thompson.
Drilling machines, &c.—762—J. Westray and J. Forster.
Earth closets, &c.—810—A. F. Baird.
Electric apparatus—773—I. L. Pulvermacher.
Engines and boilers—725—W. Whittle.
Engines for agricultural purposes—742—H. E. Smith.
Engines, hydrostatic—733—B. W. A. Sleigh.
Engines, steam—761—W. E. Gedge.
Files, machine for cutting—729—H. Kennedy.
Fire-arms, breech-loading—710—T. Horsley.
Fire-escapes—696—W. Smith, J. Giddings, and J. Rank.
Fire, extinguishing—782—T. Atkins.
Flour, preparing hard foreign wheat for manufacturing into—778—G. Hauxwell and J. Ryder.
Food, preserving blood for use as—726—J. Dewar.
Fuel, artificial—727—G. Anderson.
Furnaces—775—J. M. Stanley.
Furnaces, blast—780—J. Watson.
Galvanometers—764—J. L. Clark.
Hats—680—J. Dunkerley.
Hats, &c.—724—H. Zox.
Hooks and eyes for picture cords, &c.—749—J. Askew.
Horses, &c., shoeing—526—A. M. Dufilhol.
Hydrocarbons, burning—708—W. E. Newton.
Iron and steel—735—I. W. Nasarow.
Iron, treating cast—794—A. C. Kirk.
Jars, &c., covers for—758—H. A. Dufrené.
Lace, manufacturing—763—J. Hartshorn.
Lamps for burning petroleum, &c.—739—A. Cole and J. Carter.
Land, &c., cultivating—769—A. V. Newton.
Liquids, evaporation of—796—R. Tooth.
Liquids, freezing—816—A. M. Clark.
Liquids, raising and forcing—802—E. Casper.
Lubricators—771—J. Dickson.
Match boxes, &c.—730—S. A. Bell and G. H. Higgins.
Metal plates, coating—814—E. Morewood.
Motive-power—784—J. Parker.
Nails—722—J. Manly, jun.
Nails, machines for making—723—W. Spence.
Ordnance and projectiles, breech-loading—450—A. M. Clark.
Ores, obtaining copper from—731—T. Johnson.
Organs—812—H. Willis.
Paper, waterproof—776—T. Whittaker.
Paper-hangings, mineral—714—W. E. Gedge.
Paving—743—A. M. Clark.
Pens, &c.—665—W. E. Newton.
Pianofortes—774—J. Brinsmead.
Plane irons, sheep shears, &c.—589—R. B. Mitchell.
Printing, engraving rollers for—790—R. Leake and R. Platts.
Propellers, twin-screw—745—J. G. Kincaid.
Pumps, steam—770—A. M. Clark.
Railway carriage wheels, coupling, &c.—673—J. Livesey.
Railway passenger trains, signal apparatus for—721—J. A. Haswell and G. Brown.
Railway signals, &c.—756—J. J. F. Stevens.
Railway wagon axle boxes—712—A. Smith.
Reaping machines, &c.—719—T. Bisset.
Reaping machines, &c.—750—J. Brigham and R. Bickerton.
Rulers, parallel—732—J. W. and C. R. Harrison.
Sewage, utilising—744—W. K. Stuart.
Sewing machines—751—I. Cole and A. Maxfield.
Shoes—224—C. R. Broadbent.
Skirts, skeleton—702—L. B. Schmolle.
Smoke, consuming—670—G. Hart.
Soups, &c., preparing essences for—767—H. Drake.
Spinning, &c., machinery—618—J. Vevers.
Straw, &c., stacking—700—W. Barford and T. Perkins.
Telegraphic apparatus—691—H. B. Wilder.
Tobacco pipes—752—C. R. Rockley.
Walls, &c., constructing—640—T. Lythgoe and H. Thornton.
Water, &c., heating, &c.—272—F. Wirth.
Water-closets—706—W. Rollo.
Window sashes—748—C. Scholefield.
Window, &c., cords—737—S. Jefferies.
Wood, cutting and reducing—734—J. A. Lee
Wood, machines for cutting—282—W. Ellis.
Yarns, winding—720—W. B. Thompson and W. Gall.

Inventions with Complete Specifications Filed.

Hats, bonnets, &c.—865—C. R. Broadbent.
Hides, &c., machine for beaming—841—P. Lennox.
Looms—886—H. A. Bonneville.
Railways—887—H. A. Bonneville.

Patents Sealed.

2656. G. E. Marchisio.
2657. J. Hargreaves.
2662. B. and A. B. Blackburn.
2665. A. Mackenzie and S. Robinson.
2668. A. Aitchison and H. J. Grantham.
2687. W. Winter.
2688. G. Batcheldor.
2690. J. H. Brown.
2692. T. H. Williams.
2701. W. Woodcock.
2715. J. Jameson.
2717. E. T. and C. Horsley.
2719. J. Jameson.
2733. J. and J. A. Huggett.
2753. J. Dewar.
2800. R. Hattersley.
2838. W. R. Lake.
2907. W. B. Adams.
3178. W. Thompson.
3697. J. E. Gowen.
186. J. Carr and C. Lucop.
245. H. M. Ragland.
283. F. N. Clerk.

From Commissioners of Patents' Journal, March 24.

Patents Sealed.

2703. A. Rooker.
2706. J. Kirk and J. Kirk, jun.
2713. J., B., and R. Wood.
2714. A. Morrall.
2716. G. Wilkinson.
2731. L. de la Peyrouse.
2736. H. A. Bonneville.
2743. J. Elder.
2763. W. Mitchell.
2796. J. Offord.
2838. H. Wallwork.
2851. G. Twig.
2854. J. Withinshaw and J. E. Baker.
2889. M. A. F. Mennons.
2903. E. Gessner.
2992. J. Mitchell.
3424. J. Hadley.
3632. J. Hadley.
149. J. A. Jones.
161. S. and E. Burrows.

Patents on which the Stamp Duty of £50 has been Paid.

734. S. B. Boulton.
750. J. Bullough.
753. A. V. Newton.
768. J. H. Kidd & J. C. Mather.
775. A. G. Browning.
776. A. V. Newton.
759. E. Pilling and J. Harper.
771. J. T. Romminger.
808. G. E. Donisthorpe.
778. S. Chatwood.
819. R. W. Morrell.
937. P. J. Jamet.
785. C. Farmer and T. Turner.
799. W. J. Coleman.
818. A. B. Von Rathen.
853. W. Betts.
815. D. Mackenzie.
820. H. Oakes.
822. J. Tall.
823. T. Roberts and L. Luc.
824. G. H. and J. A. Castree.
956. W. Bulstrode.

Patents on which the Stamp Duty of £100 has been Paid.

710. W. Andrews.
729. A. Haley.
719. J. Victor and J. Polglase.